Technology Transition

Initiative

FY 2011 Proposal Submittal

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1. Introduction

The Department of Defense (DoD) Science and Technology Labs produce cutting-edge technologies for our warfighters. However, under the federal government's 2-year budgeting process, the transition of promising technological capabilities and enhancements from the Labs to Acquisition Programs and Sustainment organizations can languish waiting for acquisition and operational funding. During this time, some technologies become obsolete or their continued maturation is hindered due to a lack of funds. The DoD has characterized this phenomenon with the phrase "Valley of Death". The Technology Transition Initiative (TTI) was established by Congress in the FY2003 National Defense Authorization Act and is one of several avenues to bridge the gap. It provides Research, Development, Test, and Evaluation (RDT&E) funds to such technology projects, enabling them to complete their development and testing phases in a timely manner to meet the requirements for insertion into the relevant government acquisition programs. The ultimate goal is to assure transition of advanced capabilities to the warfighter. Through TTI, DoD is able to take proactive steps to accelerate transition of new technologies and achieve that goal.

2. Summary of TTI Legislation

The specific requirements of the TTI are codified in Title 10 USC, Chapter 139, Sec. 2359a. The following is a summary of the legislation:

- Purpose: "to facilitate the rapid transition of new technologies from science and technology programs of the Department of Defense into acquisition programs of the Department for the production of such technologies."
- Objectives:
    - "To accelerate the introduction of new technologies into operational capabilities for the armed forces"
    - "To successfully demonstrate new technologies in relevant environments."
- Management of TTI
    - TTI is managed within USD/AT&L. Implementation of the program is assigned to DDR&E Research Directorate, OTT (Office of Technology Transition)
    - The legislation established the Technology Transition Council (TTC) from which the TTI Manager shall obtain advice and other assistance. The TTC is comprised of the following representatives:
        - The science and technology executive of each military department and each defense agency
        - The acquisition executive of each military department
        - The members of the Joint Requirements Oversight Council
    - A Technology Transition Working Group (TTWG) was identified by the TTC to represent them in the working-level implementation of the program.
- Selection of Projects

  - The science and technology and acquisition executives of each military department and each appropriate defense agency and the commanders of the unified and specified combatant commands may nominate technology transition projects for implementation and shall submit a list of the projects to the Manager through TTWG representatives.
  - The Manager, in consultation with the TTC (or TTWG), shall select projects for implementation from the projects on the lists submitted.
- Funding of Projects
  - The amount of TTI RDT&E funds provided to a project by the military department/defense agency shall be the appropriate share, as determined by the Manager.
  - A project shall not be funded for more than four fiscal years, with a goal to transition the technology in two years or less.

In FY2006, additional legislation was enacted that provides for an expanded role of the TTC into other technology transition efforts in addition to TTI.

In FY2008, legislation was enacted removing the 50% cost share requirement and allowing the Technology Manager, working with the military departments and defense agencies, to set the appropriate cost share percentage for each funded project.

3. TTI Focus

Given the objectives stated above to accelerate the introduction of new technologies into operational capabilities and demonstrate them in relevant environments, the TTI selection process will favor those technologies which can show a firm commitment from a program of record to transition/deploy and a clear linkage between the maturity level at completion of the project and the maturity level required by the program of record to accept the technology. TTI is not intended to solely further the development of a new technology. Proposals that offer to mature a technology to a certain level and demonstrate a capability without linking to a program of record or acquisition contract will not fare as well as those making this linkage. TTI is about transition, not about development.

4. Annual TTI Project Identification and Selection Process

The process for identifying and selecting TTI projects is represented in Figure 1.

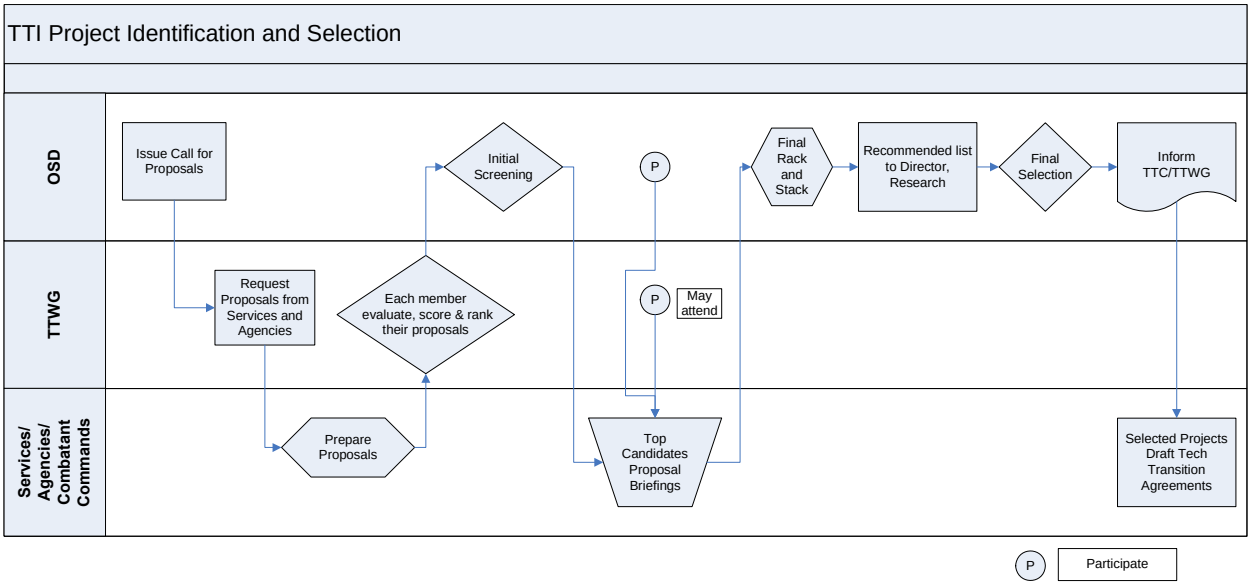

Figure 1: Project Identification and Selection Process

a) A formal project call from Director, Research will be issued to the military departments, defense agencies and combatant commands in the February timeframe each year with a projected six-month timeline for final selection of projects and funding available beginning in the next fiscal year.
b) The military departments, defense agencies and combatant commands shall develop proposals that are vetted through their respective TTWG representative. Military departments will be limited to submitting a maximum of ten proposals; all others will be limited to five.
c) Each TTWG representative shall evaluate, score and rank the proposals for their military department, defense agency or combatant command. Their evaluation and ranking will be based on both the TTI criteria and their department/agency priorities and needs. They shall forward their scored and ranked project recommendations to the TTI program manager at OSD. As part of this submittal, they must confirm their proposals meet the minimum criteria for evaluation. Note that with their submittal, the TTWG member may identify and advocate those programs that fill a critical need, but don't score highly against the prescribed criteria. They are encouraged to explain the shortfalls, identify mitigating actions their department/agency is taking to resolve these items, and provide a timeline in which they will be resolved.
d) The TTI program manager shall review the proposals submitted through each military department, defense agency and combatant command and screen them against the defined TTI criteria which are provided in Table 1.

e) Finalists in the selection process will present a short briefing to the TTI program manager to supplement the information in the written proposal and provide clarification.
f) The TTI program manager will recommend TTI projects to Director, Research for approval. In the event that any of these recommended projects present an opportunity to compete for FY 2010 funding, they may be considered for inclusion as a FY 2010 rolling start project. Circumstances that might lead to such a decision could include demonstration of a high value capability to meet a time sensitive mission need.
g) Upon notification of selection, the successful project proposals will be required to submit to the TTI program manager a signed Technology Transition Agreement (TTA) between the Technology Developing organization and the relevant Acquisition/Sustainment Program Manager committing to transition of the developed technology. Funding of selected projects will not occur until the TTA is signed by all parties.
h) TTI RDT&E funding will be targeted for issuance as soon as resources are available via DoD appropriation law, provided that the TTA is complete.

Note that the proposal preparation process should lay the foundation for the TTA since the time period between notification of selection and funding availability is very short.

Table 1: Evaluation Criteria for TTI Projects

	Criteria	Weight	How evaluated/graded
1	Technology must be from DoD S&T base (Mandatory)	10	Proposal addresses legacy funding for technology developed. (6.1, 6.2, 6.3, SBIR, DARPA, ACTD/JCTD, etc.). This funding must be identified. Technology being developed in-house in DoD labs will receive higher scores.
2	Cost sharing to leverage TTI funding (Mandatory)	5	Cost share may be R&D, O&M or Procurement funds. Cost share may not be funding prior to the TTI project nor follow-on acquisition funding after the proposed TTI project. Yes/no criterion
3	Project duration must be 4 years or less (Mandatory)	10	Projects of shorter duration that achieve transition success early are rated higher than longer duration projects . The goal is transition in 2 years or less. Focus will be on "Ready for Operational Test" and "Ready for Operational Fielding" dates
4	Funding must accelerate technology transition into DoD acquisition/sustainment programs (Mandatory)	20	Compelling case that the TTI investment fills a gap between current S&T and acquisition funding and enables a capability sooner than would otherwise occur. Yes/no criterion
5	Technology Maturity at the time of proposal submission	15	TTI generally seeks mature technologies (TRL 6 or 7) to assure transition. On a case by case basis exception, a TRL 5 with high payoff will be considered, but will receive a score of 0. A more mature technology will score higher in this category.
6	Value to the Warfighter	45	Identify the extent to which deployment of the technology will directly impact the ability to prosecute/win a war, save lives, or provide other operational enhancements or efficiencies. Link to the appropriate Joint Capability Area. Identify Service or Joint strategic objective(s) or COCOM requirement supported. Address from the "big picture" system-level. Does it support strategic shift of capabilities described in Quadrennial Defense Review? Near-term impact to overseas contingency operations will be graded higher. Proposals identifying themselves as supporting the Rapid Reaction Technology Office (RRTO) will be evaluated by a RRTO representative. Identify any other programmatic characteristics that contribute to the project's value to DoD.
7	Established Exit Criteria	30	The acquisition customer has identified key performance parameters that must be achieved to secure their commitment for technology insertion.
8	Potential for joint use	15	Write to the potential pervasive application of the technology. Joint service/agency/combatant command applicability is desirable and in such cases a joint submission is encouraged. Joint Component proposals will score higher than Component-unique proposals.
9	Commitment to Transition	50	The most heavily weighted criterion. Strong evidence of commitment from receiving acquisition organization. Letter of Advocacy from relevant military department/defense agency/Combatant Command Acquisition Program Manager who will incorporate the technology into a weapons system or field the capability. Also, identify funded program and Program of Record budget data for acquiring program.

5. Technology Transition Initiative Proposal Guide/Template (FY 2011)

TTI Proposals should be succinct but sufficiently detailed to clearly address the evaluation criteria. Target size should be 6 pages or fewer and address each of the questions listed. Proposal submittals will be accompanied by a quad chart (Figure 2 for template) submitted as a separate file. The proposals will be in MS Word and the quad chart will be in MS PowerPoint. Proposals not following these guidelines will receive lower scores. Proposals will only be accepted from members of the Technology Transition Working Group (TTWG) identified in Appendix A. Quad charts straying from this guide may negatively impact the proposal's score as well.

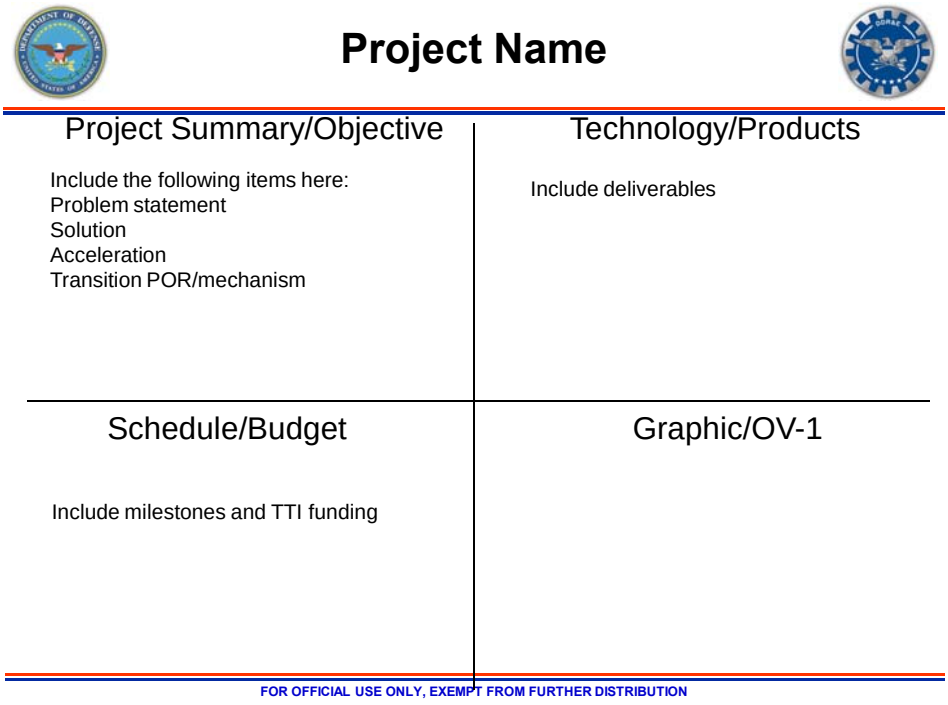

Figure 2: Quad Chart Template

From Military Department/Agency/Command name: _____

Proposal Title: _____

1. What is the technology/product(s) to be transitioned? Provide a description and photo(s) if available. Has this effort previously been submitted for consideration as a TTI project? Is it also being submitted to other OSD organizations to solicit funding from their programs?

2. The technology must be from the DoD S&T base. (Evaluation Criterion # 1). Identify the specific S&T funding source(s) and activity that has invested in its development. Include the Program Element(s) (PE) under which this work was executed. Describe if the work has been done in-house or contracted out. This criterion is mandated by the TTI legislation and failure to clearly and explicitly identify S&T funding sources will be grounds to remove the proposal from further consideration.

	PE	FY __	FY__	FY__	FY__	FY__
Mil Dep/Agency						
6.1						
6.2						
6.3						
SBIR						
AC/JCTD						
DARPA						
Other						
Total						

3. Describe the current problem. Describe the proposed TTI project and how the current problem will be resolved. Briefly summarize the project plan and objectives and identify specific project outcomes you plan to attain, relating them to your problem statement. Please spell out all acronyms. Project description should be written at a level that assumes no prior knowledge of the technology or application by the reviewer, but should be limited to 4-5 paragraphs. If the technology is such that it can't succinctly be described here, provide additional information as an attachment. Identify small businesses that will be participating in this project (Note: this is for information only and will not effect the proposal score).

4. Describe the funding profile required to assure transition of the technology upon completion of the TTI project. Include requested TTI funding and related cost share (Evaluation Criteria #2). Identify the specific source of the cost share funding to include the PE. This item will be scored as a pass/fail criterion. The actual amount the sponsoring organization funds will factor into the "Commitment to Transition" criterion. Also, identify follow-on procurement funding, to include the PE, (consistent with the program budget information provided in Item 11) that is anticipated by the acquisition/sustainment organization following transition. These are mandatory criteria established by the TTI legislation and failure to adequately address them will be grounds to remove the proposal from further consideration.

			TTI Project Duration (4 years max)				Follow-on Procurement			Total
$M ($0.000)		Appn*	FY10	FY11	FY12	FY13	FY?	FY?	FY?	Cost
TTI Funding		RDTE-DW								**$0.000**
Cost Share	Service:									**$0.000**
	Agency:									**$0.000**
	Command:									**$0.000**
	Industry:									**$0.000**
	Other:									**$0.000**
Follow-on Procurement										**$0.000**
Total			**$0.000**	**$0.000**	**$0.000**	**$0.000**	**$0.000**	**$0.000**	**$0.000**	**$0.000**

Appn* - Appropriation name abbreviation (RDTE, OMA, DWCF, APAF, etc)

Note: Modify the table as appropriate for the proposed duration of the TTI project. Extend the follow-on procurement information as far into the future as is reasonably feasible.

5. Provide a Gantt chart schedule showing key milestones in the proposed project. Highlight the technology availability date (i.e., when the technology is ready for operational test) and the technology fielding date (i.e., when the technology is ready to be delivered for operational use). The goal is to transition the technology in 2 years or less (Evaluation Criteria #3). This item will be scored on a sliding scale. Shorter projects will receive higher scores than longer projects.

6. Describe how this proposed TTI project would accelerate technology/product transition by how many months/years and why. (Evaluation Criterion #4). Provide timeline of current transition plan without assistance from TTI Program. Provide accelerated transition plan/timeline that will result from TTI Program. These timelines should be in the form of simple Gantt charts. If transition of equipment/capability will be a spiral upgrade into a current Program of Record, provide the schedule for the Initial Operating Capability or Full Operating Capability for the Program of Record. This is a pass/fail criterion mandated by the TTI legislation and failure to clearly show how the TTI funding accelerates transition will be grounds to remove the proposal from further consideration.

7. What is the Technology Readiness Level (TRL) at this time? What will the TRL be at the completion of the proposed TTI project (Evaluation Criterion #5)? Confirm the TRL at completion meets the needs of the Program of Record. TTI targets proposals with relatively high TRL levels (preferably TRL 6-7). Technologies with a more advanced current TRL will score higher than those with a lower TRL. Proposals with a current TRL of 5 will be considered on a case by case basis. Proposals with a current TRL less than 5 will be rejected. TRL definitions are at Appendix B (hardware) and Appendix C (software). Provide a short summary of your analysis that determined both the current and planned TRL and document any additional organization/command/agency (i.e., independent) review that may have been done to verify the TRL.

a. What is the Manufacturing Readiness Level (MRL) at this time? What will the MRL be at the completion of the proposed project? Have critical manufacturing technologies been identified and matured? MRL definitions are at Appendix D.

8. How will the warfighter benefit from this transitioned technology? (Evaluation Criterion #6). Identify the extent to which deployment of the technology will directly impact the ability to prosecute/win a war, save lives, or provide other operational enhancements and/or efficiencies. Address the value from the "big picture" system-level perspective. How does this project support current operations. How does it support DoD's need to shift the portfolio of capabilities to address the broad range of security challenges as described in the 2010 Quadrennial Defense Review (http://www.defense.gov/qdr)? Does it support or relate to efforts sponsored by the Rapid Fielding Directorate (RFD) or the Joint Improvised Explosive Device Defeat Office (JIEDDO)? Identify the Joint Capability Area (JCA) this technology addresses (the JCAs are identified and defined in Appendix E). Identify any Service or Joint strategic objective(s) or COCOM requirement supported. These may be located on the Joint Staff Integrated Priority List: (http://www.intelink.sgov.gov/wiki/Combatant_Commands%27_Integrated_Priority_Lists). Identify any requirements document generated via the Joint Capabilities Integration Development System (JCIDS) from which the requirement is drawn. Efficiencies can include a positive Return on Investment (ROI) or other financial/programmatic/non-operational improvement. If these efficiencies are cited as part of a value proposition, ensure sufficient justification for the claims is included; citing an improvement/efficiency without explaining how or justifying its size will not improve the score.

9. What are the required exit criteria for this proposed project such that the acquisition program manager/procuring organization has agreed to insert this technology, thus assuring transition? Discreet, quantifiable criteria will score higher than general goals. (Evaluation Criterion #7).

10. Will this technology be used in a joint environment? What is the potential for joint use or joint capability? If joint capability, identify the lead department/agency/command or Joint Program Office. (Evaluation Criterion #8).

11. What is the military department/defense agency/combatant command's commitment to transition? (Evaluation Criterion #9). This is the most heavily weighted of the criteria because transition is a critical and reportable metric of the TTI program to Congress.

    The proposal must address two commitments: 1) the proposed cost share stated in item 4 and 2) the insertion of the developed technology into an acquisition/sustainment program assuming the exit criteria are met. For the former, low levels of department/agency cost share, though complying with the mandatory cost share criterion can be interpreted as a lack of commitment from the department/agency. For the latter, showing a comprehensive end

item acquisition strategy with the transitioned item as a system component will indicate a high level of commitment.

The proposal must include an advocacy letter from the relevant acquisition program manager(s)/procuring organization(s) articulating their pull for this technology and commitment to insert the technology in their acquisition/sustainment program. The score awarded for this criterion is influenced by the degree to which the advocacy letter makes a compelling case for:

- The value to the warfighter. (Supports criterion #6).
- Their commitment to insertion/implementation funding. What caveats exist regarding this commitment? What are the required exit criteria from the TTI program that must be met to assure insertion in their program? (Supports criterion #7). Are funds already identified in the approved POM to insert this technology? If not, what action(s) will be taken to assure funding for implementation?

Advocacy letters that endorse projects, but don't convey commitment of funds will be assessed by the evaluation team, but will not compare favorably to those that document a commitment to provide funding. Commitments that document a clear intent to incorporate the technology to be transitioned into a program of record will score higher than those that simply advocate the use of TTI funds to further the technology.

Identify the Program Element (PE) Title, PE Number, Appropriation Name, and the project number (if applicable), or most recent President's Budget Procurement P1 Budget Exhibit Line Number, for the relevant acquisition program.

PE /Budget Line Number Title: _____
PE /Budget Line Number: _____
Appropriation Name: _____
Project Number: _____

What is the status of this procurement funding? Is it funded, i.e., included in an FY 2011 President's Budget Program of Record, or is it unfunded and being addressed in POM12 or a subsequent programming update? If it is unfunded, what is the plan to obtain the required funding and what internal department/agency support do you have for your initiative?

12. Contact Information

Technology project manager:
(Name, organization, e-mail address, phone number)

Acquisition project manager:
(Name, organization, e-mail address, phone number)

Financial point of contact (for execution oversight of TTI funding):
(Name, organization, e-mail address, phone number)

13. Authors of proposals that score highly may be requested to make a presentation to the TTI Manager at OSD. The purpose of the presentation is to clarify questions that arise in the proposal review process. The prime objective of the presentation is to complement the submitted proposal with greater detail regarding the technology, its maturity, the proposed application and insertion of the technology, and its probability of success and transition. The outline for the presentation is at Appendix G. A PowerPoint presentation template will be provided to the finalists. TTWG members will be invited to attend the presentations.

14. A signed Technology Transition Agreement (TTA) will be required for all approved TTI projects before funding is released. While a TTA is not required to be submitted with the proposal, the foundation for the TTA should be laid during proposal preparation since the time period between notification of selection and funding availability is very short. A guide identifying the components of a TTA is at Appendix H. It should take approximately 30 days to draft the TTA so that it is ready for coordination. Coordination time will vary between the Components. Prospective awardees should make timely progress towards completing TTA coordination. Failure to complete the TTA in a timely fashion may be grounds to terminate the project prior to initiation and replace it with an alternate project.

Appendix A Technology Transition Working Group Representatives

OSD		TTWG Lead Mrs. Cynthia Gonsalves Office of Technology Transition Crystal Mall 3, Suite 105 1851 South Bell Street Arlington VA 22202-3517 Phone: 703-607-5315 Fax: 703-697-1456 E-mail: cynthia.gonsalves@osd.mil
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Appendix B Definitions of Technology Readiness Levels (TRLs)

Excerpted from DoD Technology Readiness Assessment Deskbook
September 2003
Prepared by DUSD (S&T)

Table III-1. TRL Definitions, Descriptions, and Supporting Information (Source: *Interim Guidebook*, dated October 30, 2002)

TRL	Definition	Description	Supporting Information
1	Basic principles observed and reported	Lowest level of technology readiness. Scientific research begins to be translated into applied research and development. Examples might include paper studies of a technology's basic properties.	Published research that identifies the principles that underlie this technology. References to who, where, when.
2	Technology concept and/or application formulated	Invention begins. Once basic principles are observed, practical applications can be invented. Applications are speculative, and there may be no proof or detailed analysis to support the assumptions. Examples are limited to analytic studies.	Publications or other references that outline the application being considered and that provide analysis to support the concept.
3	Analytical and experimental critical function and/or characteristic proof of concept	Active research and development is initiated. This includes analytical studies and laboratory studies to physically validate analytical predictions of separate elements of the technology. Examples include components that are not yet integrated or representative.	Results of laboratory tests performed to measure parameters of interest and comparison to analytical predictions for critical subsystems. References to who, where, and when these tests and comparisons were performed.
4	Component and/or breadboard validation in [a] laboratory environment	Basic technological components are integrated to establish that they will work together. This is relatively "low fidelity" compared to the eventual system. Examples include integration of "ad hoc" hardware in the laboratory.	System concepts that have been considered and results from testing laboratory-scale breadboard(s). References to who did this work and when. Provide an estimate of how breadboard hardware and test results differ from the expected system goals.
5	Component and/or breadboard validation in [a] relevant environment	Fidelity of breadboard technology increases significantly. The basic technological components are integrated with reasonably realistic supporting elements so they can be tested in a simulated environment. Examples include "high-fidelity" laboratory integration of components.	Results from testing a laboratory breadboard system that are integrated with other supporting elements in a simulated operational environment. How does the "relevant environment" differ from the expected operational environment? How do the test results compare with expectations? What problems, if any, were encountered? Was the breadboard system refined to match the expected system goals more nearly?

Table III-1. TRL Definitions, Descriptions, and Supporting Information (Source: *Interim Guidebook*, dated October 30, 2002) (Continued)

TRL	Definition	Description	Supporting Information
6	System/subsystem model or prototype demonstration in a relevant environment	Representative model or prototype system, which is well beyond that of TRL 5, is tested in a relevant environment. Represents a major step up in a technology's demonstrated readiness. Examples include testing a prototype in a high-fidelity laboratory environment or in [a] simulated operational environment.	Results from laboratory testing of a prototype system that is near the desired configuration in terms of performance, weight, and volume. How did the test environment differ from the operational environment? Who performed the tests? How did the test compare with expectations? What problems, if any, were encountered? What are/were the plans, options, or actions to resolve problems before moving to the next level?
7	System prototype demonstration in an operational environment	Prototype near, or at, planned operational system. Represents a major step up from TRL 6, requiring demonstration of an actual system prototype in an operational environment such as an aircraft, vehicle, or space. Examples include testing the prototype in a test bed aircraft.	Results from testing a prototype system in an operational environment. Who performed the tests? How did the test compare with expectations? What problems, if any, were encountered? What are/were the plans, options, or actions to resolve problems before moving to the next level?
8	Actual system completed and qualified through test and demonstration	Technology has been proven to work in its final form and under expected conditions. In almost all cases, this TRL represents the end of true system development. Examples include developmental test and evaluation of the system in its intended weapon system to determine if it meets design specifications.	Results of testing the system in its final configuration under the expected range of environmental conditions in which it will be expected to operate. Assessment of whether it will meet its operational requirements. What problems, if any, were encountered? What are/were the plans, options, or actions to resolve problems before finalizing the design?
9	Actual system proven through successful mission operations	Actual application of the technology in its final form and under mission conditions, such as those encountered in operational test and evaluation. Examples include using the system under operational mission conditions.	Operational test and evaluation reports.

Table III-2. Additional Definitions of TRL Descriptive Terms (Source: *Interim Guidebook*, dated October 30, 2002)

Term	Definition
Breadboard	Integrated components that provide a representation of a system/subsystem and that can be used to determine concept feasibility and to develop technical data. Typically configured for laboratory use to demonstrate the technical principles of immediate interest. May resemble final system/subsystem in function only.
High Fidelity	Addresses form, fit, and function. High-fidelity laboratory environment would involve testing with equipment that can simulate and validate all system specifications within a laboratory setting.
Low Fidelity	A representative of the component or system that has limited ability to provide anything but first-order information about the end product. Low-fidelity assessments are used to provide trend analysis.
Model	A functional form of a system, generally reduced in scale, near or at operational specification. Models will be sufficiently hardened to allow demonstration of the technical and operational capabilities required of the final system.
Operational Environment	Environment that addresses all the operational requirements and specifications required of the final system to include platform/packaging.
Prototype	A physical or virtual model used to evaluate the technical or manufacturing feasibility or military utility of a particular technology or process, concept, end item, or system.
Relevant Environment	Testing environment that simulates the key aspects of the operational environment.
Simulated Operational Environment	Either (1) a real environment that can simulate all of the operational requirements and specifications required of the final system or (2) a simulated environment that allows for testing of a virtual prototype; used in either case to determine whether a developmental system meets the operational requirements and specifications of the final system.

Appendix C Software-Specific Definitions and Descriptions of TRLs

Excerpted from DoD Technology Readiness Assessment Deskbook
September 2003
Prepared by DUSD (S&T)

TRL	Definition	Description
I	SW: Functionality conjectural	Lowest level of software readiness. Basic research begins to be translated into applied research and development. Examples might include a concept that can be implemented in software or analytic studies of an algorithm's basic properties.
2	SW: Technology concept and/or application formulated	Invention begins. Once basic principles are observed, practical applications can be invented. Applications may be speculative and there may be no proof or detailed analysis to support the assumptions. Examples are limited to analytic studies.
3	SW: Analytical and experimental critical functions and/or characteristic proof of concept	Active research and development is initiated. This includes analytical predictions of separate software elements. Examples include software components that are not yet integrated or representative but satisfy an operational need. Algorithms run on a surrogate processor in a laboratory environment.
4	SW: Functionality demonstrated in a laboratory environment	Basic software components are integrated to establish that they will work together. They are relatively primitive with regard to efficiency and reliability compared with the eventual system. System software architecture development initiated to include interoperability, reliability, maintainability, extensibility, scalability, and security issues. Software integrated with simulated current/legacy elements as appropriate.
5	SW: Functionality and performance demonstrated in a relevant environment	Reliability of software ensemble increases significantly. The basic software components are integrated with reasonably realistic supporting elements so that it can be tested in a simulated environment. Examples include "high-fidelity" laboratory integration of software components. System software architecture established. Algorithms run on a processor(s) with characteristics expected in the operational environment. Software releases are "Alpha" versions and configuration control initiated. Verification, Validation, and Accreditation (VV&A} initiated.

TRL	Definition	Description
6	SW: Functionality and performance demonstrated in a realistic simulated (live/virtual) operational environment	Representative model or prototype system, which is well beyond that of TRL 5, is tested in a relevant environment. Represents a major step up in software-demonstrated readiness. Examples include testing a prototype in a live/virtual experiment or in simulated operational environment. Algorithm run on processor or operational environment integrated with actual external entities. Software releases are “Beta” versions and are configuration controlled. Software support structure in development. VV&A in process.
7	SW: Functionality and performance demonstrated in an operational test environment	Represents a major step up from TRL 6, requiring the demonstration of an actual system prototype in an operational environment, such as in a command post or air/ground vehicle. Algorithms run on processor of the operational environment integrated With actual external entities. Software support structure in place. Software releases are in distinct versions. Frequency and severity of software deficiency reports do not significantly degrade functionality or performance. VV&A completed
8	SW: Functionality, performance, and quality attributes validated in an operational environment.	Software has been demonstrated to work in its final form and under expected conditions. In most cases, this TRL represents the end of system development. Examples include test and evaluation of the software in its intended system to determine if it meets design specifications. Software releases are production version and are configuration controlled in a secure environment. Software deficiencies are rapidly resolved through support structure
9	SW: Functionality, performance, and quality attributes proven in an operational environment through successive successful accomplishment of mission operations.	Actual application of the software in its final form and under mission conditions, such as those encountered in operational test and evaluation. In almost all cases, this is the end of the last “bug fixing” aspects of system development. Examples include using the system under operational mission conditions. Software releases are production versions and are configuration controlled. Frequency and severity of software deficiencies are at a minimum

Appendix D Manufacturing Readiness Levels

Manufacturing Readiness Resources

Manufacturing Readiness Levels and Assessments are covered in the DAU Production, Quality and Manufacturing Community of Practice located within the Acquisition Community Connection (ACC). You can access the PQM Community of practice at the following url:

https://acc.dau.mil/pqm

The MRA folder is located near the bottom of the Six Sigma swoosh. That folder contains many resources to help you to understand, develop and manage your manufacturing risks. This site is open to the public. Many MRL resources can be found directly from the main page. For example, if you click on any of the Acquisition Life Cycle Phases you will be taken to the Defense Acquisition Guidebook that describes those phases. If you roll over a Review or Audit the screen will pop-up the name of the review or audit. If you click on one of the MRLs it will take you directly to checklist for that MRL.

The Manufacturing Readiness Guide: is broken down into six chapters as follows:

Chapter 1: The Environment for Manufacturing Readiness
Chapter 2: MRLs and Their Application
Chapter 3: Manufacturing Planning and Tools
Chapter 4: Programs that Facilitate Manufacturing Readiness
Chapter 5: Challenges and Considerations
Chapter 6: Key Responsibilities and Activities

The guide is available at the following url:

https://acc.dau.mil/CommunityBrowser.aspx?id=109616&lang=en-US

The detailed definitions of the MRLs are provided in the following table.

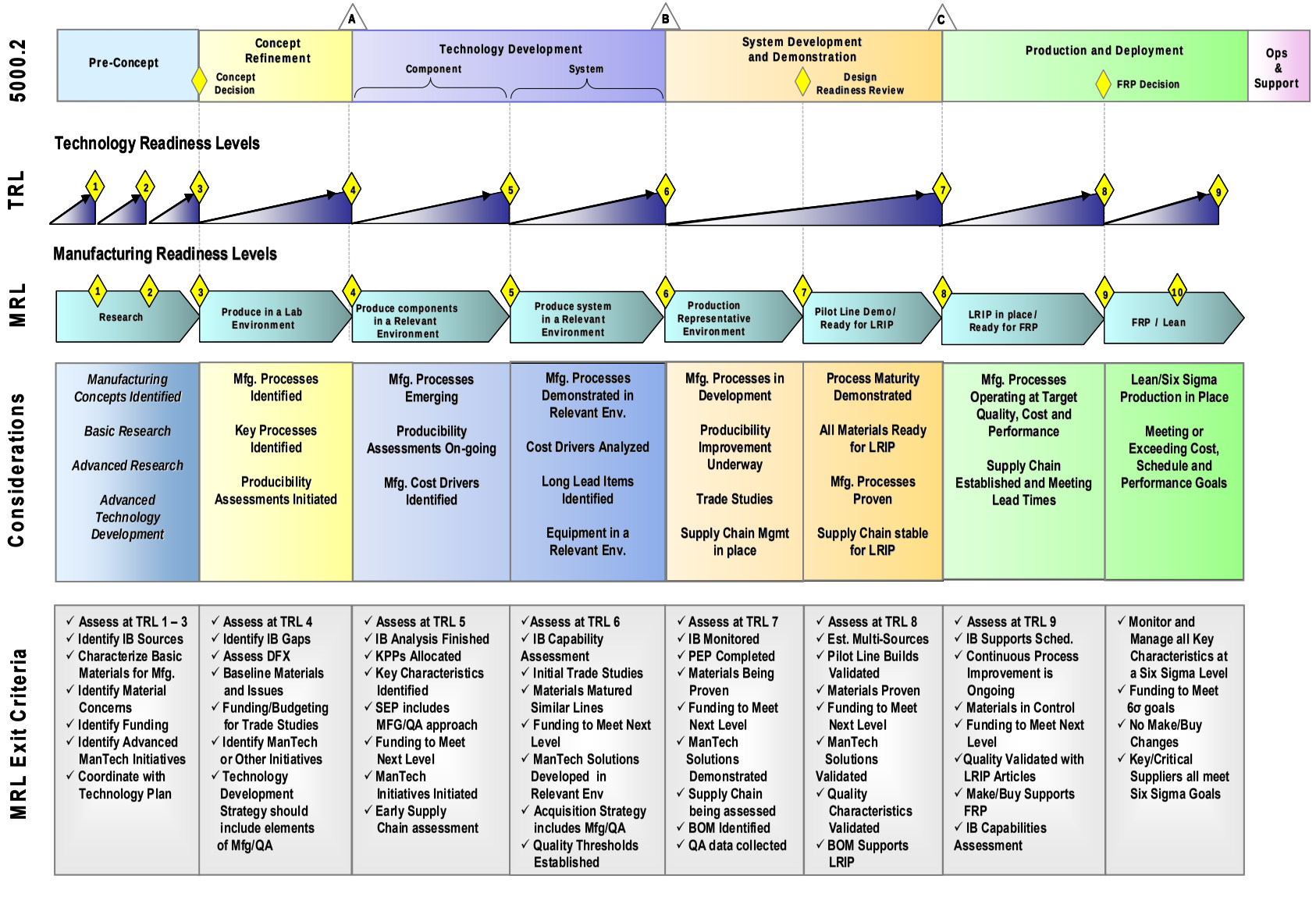
MRL	Definition	Description	Phase
1	Basic Manufacturing Implications Identified	Basic research activities expand scientific principles that may have manufacturing implications. The focus is on a high level assessment of manufacturing opportunities. The research is unfettered.	Pre Concept Refinement
2	Manufacturing concepts Identified	Invention begins. Manufacturing science and/or concept is described in application context. Identification of material and process approaches are limited to paper studies and analysis. Initial manufacturing feasibility and issues are emerging.	Pre Concept Refinement
3	Manufacturing Proof of Concept Developed	Analytical or laboratory experiments are conducted to validate paper studies. Experimental hardware or processes have been created, but are not yet integrated or representative. Materials and/or processes have been characterized for manufacturability and availability but further evaluation and demonstration is required.	Pre Concept Refinement

MRL	Definition	Description	Phase
4	Capability to produce the technology in a laboratory environment	Required investments, such as manufacturing technology development identified. Processes to ensure manufacturability, producibility and quality are in place and are sufficient to produce technology demonstrators. Manufacturing risks identified for prototype build. Manufacturing cost drivers identified. Producibility assessments of design concepts have been completed. Key Performance Parameters (KPP) identified. Special needs identified for tooling, facilities, material handling and skills	Concept Refinement (CR) leading to a Milestone A decision
5	Capability to produce prototype components in a production relevant environment	Mfg strategy refined and integrated with Risk Mgt Plan. Identification of enabling/critical technologies and components is complete. Prototype materials, tooling and test equipment, as well as personnel skills have been demonstrated on components in a production relevant environment, but many manufacturing processes and procedures are still in development. Manufacturing technology development efforts initiated or ongoing. Producibility assessments of key technologies and components ongoing. Cost model based upon detailed end-to-end value stream map.	Technology Development (TD) Phase
6	Capability to produce a prototype system or subsystem in a production relevant environment	Initial mfg approach developed. Majority of manufacturing processes have been defined and characterized, but there are still significant engineering/design changes. Preliminary design of critical components completed. Producibility assessments of key technologies complete. Prototype materials, tooling and test equipment, as well as personnel skills have been demonstrated on subsystems/ systems in a production relevant environment. Detailed cost analyze includes design trades. Cost targets allocated. Producibility considerations shape system development plans. Long lead and key supply chain elements identified. Industrial Capabilities Assessment (ICA) for MS B completed.	Technology Development (TD) phase leading to a Milestone B decision
7	Capability to produce systems, subsystems or components in a production representative environment	Detailed design is underway. Material specifications are approved. Materials available to meet planned pilot line build schedule. Manufacturing processes and procedures demonstrated in a production representative environment. Detailed producibility trade studies and risk assessments underway. Cost models updated with detailed designs, rolled up to system level and tracked against targets. Unit cost reduction efforts underway. Supply chain and supplier QA assessed. Long lead procurement plans in place. Production tooling and test equipment design & development initiated.	System Development & Demo (SDD) leading to Design Readiness Review (DRR)

MRL	Definition	Description	Phase
8	Pilot line capability demonstrated. Ready to begin low rate production	Detailed system design essentially complete and sufficiently stable to enter low rate production. All materials are available to meet planned low rate production schedule. Manufacturing and quality processes and procedures proven in a pilot line environment, under control and ready for low rate production. Known producibility risks pose no significant risk for low rate production. Engineering cost model driven by detailed design and validated. Supply chain established and stable. ICA for MS C completed.	System Development & Demo leading to a Milestone C decision
9	Low Rate Production demonstrated. Capability in place to begin Full Rate Production	Major system design features are stable and proven in test and evaluation. Materials are available to meet planned rate production schedules. Manufacturing processes and procedures are established and controlled to three-sigma or some other appropriate quality level to meet design key characteristic tolerances in a low rate production environment. Production risk monitoring ongoing. LRIP cost goals met, learning curve validated. Actual cost model developed for FRP environment, with impact of Continuous improvement.	Production & Deployment leading to a Full Rate Production (FRP) decision
10	Full Rate Production demonstrated and lean production practices in place	This is the highest level of production readiness. Engineering/design changes are few and generally limited to quality and cost improvements. System, components or items are in rate production and meet all engineering, performance, quality and reliability requirements. All materials, manufacturing processes and procedures, inspection and test equipment are in production and controlled to six-sigma or some other appropriate quality level. FRP unit cost meets goal, funding sufficient for production at required rates. Lean practices well established and continuous process improvements ongoing.	Full Rate Production/ Sustainment

A summary chart that relates the MRLs to TRLs and provides exit criteria for each level follows on the next page. There is more detailed information concerning the exit criteria at the COP web site.

Manufacturing Readiness Levels



Dated: 23 Jan 2008

Appendix E Joint Capability Areas (JCAs)

JCAs are collections of like DOD capabilities functionally grouped to support capability analysis, strategy development, investment decision making, capability portfolio management, and capabilities-based force development and operational planning.

The following pages provide a listing of the JCA framework and definitions of each of the capability areas.

JCA Framework
(clean copy)

Joint Capability Areas

Approved as of 12 January 2009

For further information contact: j7jcaa@js.pentagon.mil

FORCE SUPPORT

1 Force Support – The ability to establish, develop, maintain and manage a mission ready Total Force.

1.1 Force Management – The ability to integrate new and existing human and technical assets from across the Joint Force and its mission partners to make the right capabilities available at the right time and place to support National security.

1.1.1 Global Force Management – The ability to align force apportionment, assignment, and allocation methodologies in support of the National Defense Strategy and joint force availability requirements; present comprehensive insights into the global availability and operational readiness of U.S. military forces; globally source joint force requirements; and provide senior decision makers a vehicle to quickly and accurately assess the impact and risk of proposed allocation, assignment and apportionment changes. *(From Annex A (Glossary) "Global Force Management Guidance FY 2005")*

1.1.1.1 Apportionment – The ability to designate forces and resources to a combatant commander for contingency planning.

1.1.1.2 Assignment – The ability to place forces and resources under the combatant command authority of a combatant commander IAW Title 10 USC Section 162.

1.1.1.3 Allocation – The ability to provide forces and resources, without transferring combatant command authority, to another combatant commander for execution planning or actual execution.

1.1.1.4 Readiness Reporting – The ability to evaluate, appraise, and characterize the status of military forces and the supporting infrastructure to perform assigned missions.

1.1.2 Force Configuration – The ability to take DOTMLPF requirements and translate them into programs and structure to accomplish the missions and functions required by the Secretary of Defense.

1.1.3 Global Posture Execution – The ability to develop a global network of host-nation relationships, activities, and footprint of facilities and forces by refining operational requirements for, implementing, and sustaining posture changes.

1.2 Force Preparation – The ability to develop, enhance, adapt and sustain the total force to effectively support National security.

1.2.1 Training – The ability to enhance the capacity to perform specific functions and tasks using institutional, operational, or self-development (to include distance

leaning) domains in order to improve the individual or collective performance of personnel, units, forces, and staffs. (Derived from CJCSM 3500.03B)

1.2.2 Exercising – The ability to plan, prepare, execute and evaluate maneuvers or simulated operations to validate training or conduct mission rehearsal. (Derived form CJCSM 3500-03A)

1.2.3 Educating – The ability to convey general bodies of knowledge and develop habits of mind applicable to a broad spectrum of endeavors to foster breadth of view, diverse perspectives, critical analysis, and abstract reasoning. (Derived from CJCSI 1800.01C)

1.2.3.1 Professional Military Education – The ability to convey (by in-residence or distant learning) the broad body of knowledge that develops the habits of mind essential to increasing proficiency in the art and science of war.

1.2.3.2 Civilian Education – The ability to develop knowledge at the post-secondary academic level to enhance the DoD's mission.

1.2.4 Doctrine – The ability to provide fundamental principles that guide the employment of US military forces in coordinated action toward a common objective and serves to make US policy and strategy effective in the application of US military power. (Developed from CJCSI 3170.01F/CJCSI 5120.02)

1.2.5 Lessons Learned – The ability to obtain results from an evolution or observation of an implemented corrective action that contributed to improved performance or increased capability or from an evaluation or observation of a positive finding that did not necessarily require corrective action other than sustainment. (Derived from CJCSI 3150.25C)

1.2.6 Concepts – The ability to provide a notion or statement of an idea – an expression of how something might be done. (Derived from CJCSI 3010.02B)

1.2.7 Experimentation – The ability to conduct an iterative process for developing and assessing concept-based hypotheses to identify and recommend the best value-added solutions for changes in doctrine, organization, training, materiel, leadership and education, personnel, and facilities and policy required to achieve significant advances in future operational capabilities. (Derived from CJCSI 3170.01F)

1.3 Human Capital Management – The ability to ensure, within the life cycle management of total force human resources, the availability of highly motivated personnel equipped with required skill sets and capabilities to achieve mission success.

1.3.1 Personnel and Family Support – The ability to provide the essential programs and services that support total force members and their families' quality of life and development in a transforming and expeditionary environment.

1.3.1.1 Community Support – The ability to sustain a military member and family support platform encompassing tuition assistance, children's education, spouse training and employment, child and youth services, morale welfare and recreation, and other programs that underwrite support to military members and their families.

1.3.1.2 Casualty Assistance – The ability to provide authorized and necessary support services to eligible family members of deceased, Duty Status - Whereabouts Unknown (DUSTWUN), Excused Absence - Whereabouts Unknown (EAWUN), missing, ill, or injured personnel.

1.3.1.3 Mortuary Affairs – The ability to provide for search, recovery, identification, preparation, and disposition of remains of persons for whom the Services are responsible by policy and statute.

1.3.1.4 Wounded, ill and Injured Support – The ability to provide seamless support (not already covered under Health Readiness) for wounded, ill and injured military members, their families, and caregivers, across the continuum of care including recovery and rehabilitation.

1.3.2 Personnel Management – The ability to provide the oversight and provision of human resource policies and programs that contribute to the retention of total force members fully equipped to execute national strategy.

1.3.2.1 Manning – The ability to recruit, retain, sustain, assign, separate and retire members of the Total Force.

1.3.2.2 Compensation – The ability to develop, implement and oversee policies that maintain fair and competitive pay, and entitlement systems.

1.3.2.3 Disability Evaluation – The ability to provide comprehensive assessment of a Service member's fitness for continued service and recommend a disability disposition or return to duty recommendation.

1.3.2.4 Personnel Accountability – The ability to account for DoD personnel across the spectrum of peace and wartime activities.

1.4 Health Readiness – The ability to enhance DoD and our Nation's security by providing health support for the full range of military operations and sustaining the health of all those entrusted to our care.

1.4.1 Force Health Protection – The ability to sustain and protect the health and effectiveness of the human centerpiece of the American military.

1.4.1.1 Human Performance Enhancement – The ability to restore, sustain, and optimize human capabilities and augment human activities to allow the force to operate at or beyond naturally occurring performance thresholds.

1.4.1.2 Medical Surveillance / Epidemiology – The ability to collect data, perform health risk assessments, develop health risk communication and provide countermeasure options to mitigate risk.

1.4.1.3 Preventive Medicine – The ability to provide interoperable and modular public health capabilities to deliver protective and preventive countermeasures that support a fit and healthy force.

1.4.1.4 In-Transit Care – The ability to provide medical care and stabilization during transport of ill and injured.

1.4.1.4.1 In-Transit Care within a Joint Operational Area Intra-Theater – The ability to provide medical care necessary to stabilize patients to affect the movement to appropriate levels of care, while maintaining full visibility of same.

1.4.1.4.2 In-Transit Care Outside a Joint Operational Area Inter-Theater – The ability to provide medical care necessary to sustain conditions required to allow movement from a JOA to an appropriate definitive care facility (with en route care provided).

1.4.1.5 Casualty Management – The ability to provide incident site first response care, essential care (Forward Resuscitative), and definitive care in JOA and supporting theaters.

1.4.1.5.1 Biomedical Support – The ability to manage blood products, materiel, operations, and maintain all critical or medically-unique apparatus and resources.

1.4.1.5.2 Ocular Health – The ability to improve warfighter's vision through comprehensive care to include optical fabrication.

1.4.2 Health Care Delivery – The ability to build healthy communities by managing and delivering the TRICARE health benefit, utilizing both Military Treatment Facilities and the TRICARE network of healthcare providers.

1.4.2.1 Comprehensive Care Delivery in Military Facilities – The ability to provide or arrange high quality primary through tertiary care utilizing the direct care system of health care facilities.

1.4.2.2 Comprehensive Care Delivery via the Network of Civilian Providers – The ability to provide or arrange high quality primary through tertiary care using the

1.4.3 Health Service Support – The ability to sustain and continuously improve military health system mission effectiveness through the focused development of people, technology, infrastructure and joint organizational culture.

BATTLESPACE AWARENESS

2 Battlespace Awareness – The ability to understand dispositions and intentions as well as the characteristics and conditions of the operational environment that bear on national and military decision-making.

2.1 Intelligence, Surveillance and Reconnaissance – The ability to conduct activities to meet the intelligence needs of national and military decision-makers.

2.1.1 Intelligence, Surveillance and Reconnaissance Planning and Direction – The ability to synchronize and integrate the activities of collection, processing, exploitation, analysis and dissemination resources to meet information requirements of national and military decision-makers.

2.1.1.1 Define and Prioritize Intelligence, Surveillance and Reconnaissance Requirements – The ability to translate national through tactical objectives and needs into specific information and operational requirements for ISR.

2.1.1.2 Develop a Collection Strategy – The ability to determine the best approach for collecting, processing, exploiting, disseminating (PED) and analyzing data and information to address requirements.

2.1.1.3 Task and Monitor Collection, Processing, Exploitation and Dissemination Resources – The ability to task ISR resources to achieve requirements and collection strategies, continuously track status, and dynamically adjust, as required.

2.1.1.4 Intelligence, Surveillance and Reconnaissance Evaluation – The ability to assess the results of ISR operations and intelligence products to ensure that user requirements are being met.

2.1.2 Collection – The ability to obtain required information to satisfy intelligence needs.

2.1.2.1 Signals Collection – The ability to gather information based on the interception of electromagnetic impulses, however transmitted.

2.1.2.1.1 Communications Signals Collection – The ability to intercept and derive information from voice and data communications passed by radio, wire, automated info systems/networks, or other electromagnetic means.

2.1.2.1.2 Electronic Emissions Signals Collection – The ability to intercept and derive information from non-communication emitter transmissions.

2.1.2.1.3 Foreign Instrumentation Signals Collection – The ability to intercept data from foreign equipment and control systems.

2.1.2.2 Computer Network Collection – The ability to use computer network exploitation (CNE) to gather data from target or adversary automated information systems, networks, and data bases.

2.1.2.3 Imagery Collection – The ability to obtain information from the visible and non-visible spectrum based on the likeness or visual presentation of any natural or man-made feature, object, or activity.

2.1.2.3.1 Electro-Optical Imagery Collection – The ability to gather information from a visual presentation derived from the ultraviolet through far infrared electromagnetic spectrum.

2.1.2.3.1.1 Panchromatic Collection – The ability to obtain a visual presentation from the visible spectrum of any natural or man-made feature, object, or activity.

2.1.2.3.1.2 Infrared Collection – The ability to obtain a likeness or visual presentation from the Infrared spectrum of any natural or man-made feature, object, or activity.

2.1.2.3.1.3 Ultraviolet Collection – The ability to obtain a likeness or visual presentation from the ultraviolet spectrum of any natural or man-made feature, object, or activity.

2.1.2.3.1.4 Spectral Collection – The ability to obtain data from reflected or emitted radiation based on the interaction of radiant energy and various materials, using discrete bands across a wide spectral band width.

2.1.2.3.1.5 Light Detection and Ranging Collection – The ability to obtain information from a visual presentation produced from emitted timed pulses of light.

2.1.2.3.2 RADAR Imagery Collection – The ability to derive information from a visual presentation produced by recording radar waves from a given object within the radiofrequency spectrum.

2.1.2.4 Measurements and Signatures Collection – The ability to collect finite metric parameters and distinctive characteristics of phenomena, equipment, or objects.

2.1.2.4.1 Electro-Optical Signatures Collection – The ability to collect information on phenomena that emit, absorb, or reflect electromagnetic energy in the ultraviolet through infrared spectrum.

2.1.2.4.2 Radar Measurements and Signatures Collection – The ability to actively or passively collect energy reflected from an object to derive information on

radar cross-sections, spatial measurements, motion and radar reflectance, and absorption characteristics.

2.1.2.4.3 Geophysical Measurements and Signatures Collection – The ability to detect phenomena and gather information transmitted through the earth (ground, water, and atmosphere) and man-made structures including emitted or reflected sounds, pressure waves, vibrations and magnetic field/ionosphere disturbances.

2.1.2.4.4 Radio-Frequency Signatures Collection – The ability to collect information from radiation transmissions and electromagnetic pulses.

2.1.2.4.5 Chemical / Biological Materials Measurements and Signatures Collection – The ability to gather information to aid in the identification and characterization of chemical and biological objects and activities.

2.1.2.4.6 Nuclear Radiation Measurements and Signatures Collection – The ability to obtain information derived from nuclear radiation and other physical phenomena associated with nuclear weapons, reactors, devices, facilities and fissile materials.

2.1.2.5 Human Intelligence, Surveillance and Reconnaissance Collection – The ability to acquire information from human resources and human reconnaissance assets.

2.1.2.5.1 Interrogation – The ability to procure information by direct or indirect questioning techniques.

2.1.2.5.2 Source Operations – The ability to develop information through the direct or indirect use and elicitation of sources.

2.1.2.5.3 Debriefing – The ability to obtain information through questioning of cooperating human sources.

2.1.2.5.4 Ground Reconnaissance – The ability to use human resources to obtain, by visual observation and other detection methods, information about activities and resources.

2.1.2.5.5 Biometrics Collection – The ability to gather information on an individual based on measurable anatomical, physiological, and behavioral characteristics.

2.1.2.5.6 Media Collection – The ability to obtain information from acquired, seized or open-sourced hardcopy documents and electronic media.

2.1.3 Processing / Exploitation – The ability to transform collected information into forms suitable for further analysis or action.

2.1.3.1 Data Transformation – The ability to select, focus, simplify, tag and transform overtly or covertly collected data into human or machine interpretable form for collaboration across the ISR community for further analysis or other action.

2.1.3.2 Objective / Target Categorization – The ability to identify, classify and verify objectives/targets enabling further analysis or action.

2.1.4 Analysis and Production – The ability to integrate, evaluate, and interpret information from available sources and develop intelligence products that enable situational awareness.

2.1.4.1 Intelligence, Surveillance and Reconnaissance Analysis Integration – The ability to identify and correlate relevant information from single or multiple sources.

2.1.4.2 Intelligence Evaluation and Interpretation – The ability to provide focused examination of problems, sources, and analytic strategies to derive knowledge and develop new insight on information and postulate its intelligence significance.

2.1.4.3 Intelligence, Surveillance and Reconnaissance Product Generation – The ability to develop and tailor intelligence content and products per customer requirements.

2.1.5 Intelligence, Surveillance and Reconnaissance Dissemination – The ability to present information and intelligence products that enable understanding of the operational environment to military and national decision-makers.

2.1.5.1 Real-Time Intelligence, Surveillance and Reconnaissance Data Transmission – The ability to send collected data directly to ISR processing, exploitation and analysis systems, leveraging both Net-Centric information transport and intelligence-controlled systems.

2.1.5.2 Intelligence, Surveillance and Reconnaissance Data Access – The ability to provide controlled customer access to ISR data and its products, leveraging both Net-Centric computing infrastructure and intelligence-controlled systems.

2.2 Environment – The ability to characterize and exploit the meteorological, space and oceanographic information from the subbottom of the earth's oceans up to and including space.

2.2.1 Collect – The ability to sense or acquire meteorological, oceanographic and space environmental data.

2.2.1.1 Collect Land Environmental Measurements – The ability to sense and observe the ground, soil, and/or terrain measurements to develop surface parameters.

2.2.1.2 Collect Ocean Environmental Measurements – The ability to sense and observe the oceanographic measurements to include the physical, chemical and biological aspects of oceanic and coastal processes.

2.2.1.3 Collect Hydrographic Measurements – The ability to sense and observe the maritime characteristics to aid in navigation.

2.2.1.4 Collect Bathymetric Measurements – The ability to sense and observe the precise ocean depths to determine sea floor topography.

2.2.1.5 Collect Astrometry Measurements – The ability to sense and observe the precise location, motion and intensity of celestial objects.

2.2.1.6 Collect Atmospheric Environmental Measurements – The ability to sense and observe the environmental properties of the air.

2.2.1.7 Collect Space Environmental Measurements – The ability to sense and observe space weather characteristics in the region that extends out from the atmosphere of the Earth.

2.2.2 Analyze – The ability to transform meteorological, oceanographic and space environmental data into information.

2.2.2.1 Analyze Land Environment – The ability to interpret, fuse and evaluate environmental data into an integrated depiction of the past and current state of the ground, soil, or terrain.

2.2.2.2 Analyze Ocean Environment – The ability to interpret, fuse and evaluate environmental data into an integrated depiction of the past and current state of the oceanographic measurements to include the physical, geological, chemical and biological aspects of oceanic and coastal processes.

2.2.2.3 Analyze Hydrographic Measurements – The ability to interpret, fuse and evaluate maritime characteristics to aid in navigation.

2.2.2.4 Analyze Bathymetric Measurements – The ability to interpret, fuse and evaluate precise ocean depths and sea floor topography.

2.2.2.5 Analyze Atmospheric Environment – The ability to interpret, fuse and evaluate environmental data into an integrated depiction of the past and current state of the air surrounding the Earth.

2.2.2.6 Analyze Space Environment – The ability to interpret, fuse and evaluate environmental data into an integrated depiction of the past and current state of the region that extends out from the atmosphere of the Earth.

2.2.3 Predict – The ability to describe the anticipated future state of the meteorological, oceanographic and space environment.

2.2.3.1 Predict Land Environment – The ability to describe the future state of the geologic and/or hydrologic conditions of the ground.

2.2.3.2 Predict Ocean Environment – The ability to describe the future state of oceanographic conditions to include the physical, geological, chemical and biological aspects of oceanic and coastal characteristics.

2.2.3.3 Predict Atmospheric Environment – The ability to describe the future state of the air surrounding the Earth.

2.2.3.4 Predict Space Environment – The ability to describe the future state of the region that extends out from the atmosphere of the Earth.

2.2.4 Exploit – The ability to provide relevant meteorological, oceanographic and space environmental information for integration into operational activities.

2.2.4.1 Determine Environmental Impacts – The ability to derive actionable decision parameters from environmental information.

2.2.4.2 Assess Environmental Effects – The ability to couple thresholds with actionable decision parameters to convey operation-impacting environmental knowledge to decision makers.

2.2.4.3 Produce Environmental Decision Aids – The ability to package environmental products that are discoverable and accessible.

FORCE APPLICATION

3 Force Application – The ability to integrate the use of maneuver and engagement in all environments to create the effects necessary to achieve mission objectives.

3.1 Maneuver – The ability to move to a position of advantage in all environments in order to generate or enable the generation of effects in all domains and the information environment.

3.1.1 Maneuver to Engage (MTE) – The ability to move to a position of advantage in all environments in order to employ force.

3.1.1.1 Air (MTE) – The ability to maneuver to engage in the region beginning at the upper boundary of the land or water and extending upward to the lower boundary of the Earth's ionosphere (approximately 50 KMs).

3.1.1.2 Space (MTE) – The ability to maneuver to engage in the region beginning at the lower boundary of the Earth's ionosphere (approximately 50 KMs) and extending outward. (JP 1-02).

3.1.1.3 Land (MTE) – The ability to maneuver to engage on the surface of the land.

3.1.1.4 Maritime (MTE) – The ability to maneuver to engage on the surface of the sea.

3.1.1.5 Underground (MTE) – The ability to maneuver to engage beneath the surface of the earth (bunkers, basements, tunnels, caves, etc.)

3.1.1.6 Underwater (MTE) – The ability to maneuver to engage below the surface of a body of water.

3.1.1.7 Cyberspace (MTE) – The ability to maneuver to engage within the interdependent network of information technology infrastructures and the data within them.

3.1.2 Maneuver to Insert (MTI) – The ability to place forces at a position of advantage in all environments.

3.1.2.1 Air (MTI) – The ability to maneuver to insert in the region beginning at the upper boundary of the land or water and extending upward to the lower boundary of the Earth's ionosphere (approximately 50 KMs).

3.1.2.2 Space (MTI) – The ability to maneuver to insert in the region beginning at the lower boundary of the Earth's ionosphere (approximately 50 KMs) and extending outward. (JP 1-02)

3.1.2.3 Land (MTI) – The ability to maneuver to insert on the exterior or upper boundary of the land.

3.1.2.4 Maritime (MTI) – The ability to maneuver to insert on the exterior or upper boundary of the sea.

3.1.2.5 Underground (MTI) – The ability to maneuver to insert beneath the surface of the earth (bunkers, basements, tunnels, caves, etc.)

3.1.2.6 Underwater (MTI) – The ability to maneuver to insert below the surface of a body of water.

3.1.2.7 Cyberspace (MTI) – The ability to maneuver to insert within the interdependent network of information technology infrastructures and the data within them.

3.1.3 Maneuver to Influence (MTInfl) – The ability to move to a position of advantage in all environments in order to affect the behavior, capabilities, will, or perceptions of partner, competitor, or adversary leaders, military forces, and relevant populations.

3.1.3.1 Air (MTInfl) – The ability to maneuver to influence in the region beginning at the upper boundary of the land or water and extending upward to the lower boundary of the Earth's ionosphere (approximately 50 KMs).

3.1.3.2 Space (MTInfl) – The ability to maneuver to influence in the region beginning at the lower boundary of the Earth's ionosphere (approximately 50 KMs) and extending outward. (JP 1-02).

3.1.3.3 Land (MTInfl) – The ability to maneuver to influence on the exterior or upper boundary of the land.

3.1.3.4 Maritime (MTInfl) – The ability to maneuver to influence on the exterior or upper boundary of the sea.

3.1.3.5 Underground (MTInfl) – The ability to maneuver to influence beneath the surface of the earth, (bunkers, basements, tunnels, caves, etc.).

3.1.3.6 Underwater (MTInfl) – The ability to maneuver to influence below the surface of a body of water.

3.1.3.7 Cyberspace (MTInfl) – The ability to maneuver to influence within the interdependent network of information technology infrastructures and the data within them.

3.1.4 Maneuver to Secure (MTS) – The ability to control or deny (destroy, remove, contaminate, or block with obstacles) significant areas, with or without force, in the operational area whose possession or control provides either side an operational advantage.

3.1.4.1 Air (MTS) – The ability to secure the region beginning at the upper boundary of the land or water and extending upward to the lower boundary of the Earth's ionosphere (approximately 50 KMs).

3.1.4.2 Space (MTS) – The ability to secure the region beginning at the lower boundary of the Earth's ionosphere (approximately 50 KMs) and extending outward. (JP 1-02).

3.1.4.3 Land (MTS) – The ability to secure the surface of the land.

3.1.4.3.1 Populations (MTSL) – The ability to provide security to individuals in an area.

3.1.4.3.2 Infrastructure (MTSL) – The ability to provide security for the basic installations and facilities on which a community depends.

3.1.4.3.3 Resources (MTSL) – The ability to provide security for critical assets.

3.1.4.4 Maritime (MTS) – The ability to secure the surface of the sea.

3.1.4.5 Underground (MTS) – The ability to secure areas beneath the surface of the earth (bunkers, basements, tunnels, caves, etc.).

3.1.4.6 Underwater (MTS) – The ability to secure areas below the surface of a body of water.

3.1.4.7 Cyberspace (MTS) – The ability to maneuver to secure within the interdependent network of information technology infrastructures and the data within them.

3.2 Engagement – The ability to use kinetic and non-kinetic means in all environments to generate the desired lethal and/or non-lethal effects from all domains and the information environment.

3.2.1 Kinetic Means – The ability to create effects that rely on explosives or physical momentum (i.e., of, relating to, or produced by motion).

3.2.1.1 Fixed Target (EK) – The ability to kinetically engage a geographic area or object that is unable to move. (Modified from JP 1-02)

3.2.1.1.1 Surface (EKF) – The ability to kinetically engage targets on land or water.

3.2.1.1.1.1 Point (EKFS) – The ability to kinetically engage a target of such small dimension that it requires the accurate placement of ordnance in order to neutralize or destroy it. (FM 101-5-1)

3.2.1.1.1.1.1 Hardened (EKFSP) – The ability to kinetically engage targets reinforced (with armor, concrete, dirt, etc.) to protect against blast, heat, or radiation.

3.2.1.1.1.1.2 Soft (EKFSP) – The ability to kinetically engage targets that are not protected against attack.

3.2.1.1.1.1.3 Chemical, Biological, Radiological and Nuclear (EKFSP) – The ability to kinetically engage targets which include hazardous materials and capabilities associated with chemical, biological, radiological, or nuclear weapons production or storage.

3.2.1.1.1.2 Area (EKFS) – The ability to kinetically engage a target consisting of a region rather than a single point. (JP 1-02) This includes circular, linear, and irregular shaped targets.

3.2.1.1.1.2.1 Hardened (EKFSA) – The ability to kinetically engage targets reinforced (with armor, concrete, dirt, etc.) to protect against blast, heat, or radiation.

3.2.1.1.1.2.2 Soft (EKFSA) – The ability to kinetically engage targets that are not protected against attack.

3.2.1.1.2 Underground (EKF) – The ability to kinetically engage targets beneath the surface of the earth (bunkers, basements, tunnels, caves, etc.).

3.2.1.1.2.1 Hardened (EKFU) – The ability to kinetically engage targets reinforced (with armor, concrete, dirt, etc.) to protect against blast, heat, or radiation.

3.2.1.1.2.2 Chemical, Biological, Radiological and Nuclear (EKFU) – The ability to kinetically engage underground targets that include hazardous materials and capabilities associated with chemical, biological, radiological, or nuclear weapons production or storage.

3.2.1.1.3 Underwater (EKF) – The ability to kinetically engage targets below the surface of a body of water.

3.2.1.1.3.1 Surf Zone (EKFU) – The ability to kinetically engage targets under water at a depth of 0-10 feet.

3.2.1.1.3.2 Very Shallow (EKFU) – The ability to kinetically engage targets under water at a depth of 10-40 feet.

3.2.1.1.3.3 Shallow (EKFU) – The ability to kinetically engage targets under water at a depth of 40-200 feet.

3.2.1.1.3.4 Deep Water (EKFU) – The ability to kinetically engage targets under water at depths greater than 200 feet.

3.2.1.2 Stationary Target (EK) – The ability to kinetically engage an object that could move but is currently not moving. (modified from JP 1-02)

3.2.1.2.1 Surface (EKS) – The ability to kinetically engage targets on land or water.

3.2.1.2.1.1 Point (EKSS) – The ability to kinetically engage a target of such small dimension that it requires the accurate placement of ordnance in order to neutralize or destroy it. (FM 101-5-1)

3.2.1.2.1.1.1 Hardened (EKSSP) – The ability to kinetically engage targets reinforced (with armor, concrete, dirt, etc.) to protect against blast, heat, or radiation.

3.2.1.2.1.1.2 Soft (EKSSP) – The ability to kinetically engage targets that are not protected against attack.

3.2.1.2.1.1.3 Chemical, Biological, Radiological and Nuclear (EKSSP) – The ability to kinetically engage targets which include hazardous materials and capabilities associated with chemical, biological, radiological, or nuclear weapons production or storage.

3.2.1.2.1.2 Area (EKSS) – The ability to kinetically engage a target consisting of a region rather than a single point. (JP 1-02) This includes circular, linear, and irregular shaped targets.

3.2.1.2.1.2.1 Hardened (EKSSA) – The ability to kinetically engage targets reinforced (with armor, concrete, dirt, etc.) to protect against blast, heat, or radiation.

3.2.1.2.1.2.2 Soft (EKSSA) – The ability to kinetically engage targets that are not protected against attack.

3.2.1.2.2 Underground (EKS) – The ability to kinetically engage targets beneath the surface of the earth (bunkers, basements, tunnels, caves, etc.).

3.2.1.2.2.1 Soft (EKSU) – The ability to kinetically engage targets that are not protected against attack.

3.2.1.2.2.2 Chemical, Biological, Radiological and Nuclear (EKSU) – The ability to kinetically engage underground targets that include hazardous materials and capabilities associated with chemical, biological, radiological, or nuclear weapons production or storage.

3.2.1.2.3 Underwater (EKS) – The ability to kinetically engage targets below the surface of a body of water.

3.2.1.2.3.1 Surf Zone (EKSU) – The ability to kinetically engage targets under water at a depth of 0-10 feet.

3.2.1.2.3.2 Very Shallow (EKSU) – The ability to kinetically engage targets under water at a depth of 10-40 feet.

3.2.1.2.3.3 Shallow (EKSU) – The ability to kinetically engage targets under water at a depth of 40-200 feet.

3.2.1.2.3.4 Deep Water (EKSU) – The ability to kinetically engage targets under water at depths greater than 200 feet.

3.2.1.3 Moving Targets (EK) – The ability to kinetically engage a system, unit, or person that is in the process of moving from one place to another.

3.2.1.3.1 Air (EKM) – The ability to kinetically engage moving targets in the region beginning at the upper boundary of the land or water and extending upward to the lower boundary of the Earth's ionosphere (approximately 50 KMs).

3.2.1.3.2 Space (EKM) – The ability to kinetically engage moving targets in the region beginning at the lower boundary of the Earth's ionosphere (approximately 50 KMs) and extending outward. (JP 1-02).

3.2.1.3.3 Surface (EKM) – The ability to kinetically engage moving targets on land or water.

3.2.1.3.3.1 Point (EKMS) – The ability to kinetically engage a moving targets of such small dimension that it requires the accurate placement of ordnance in order to neutralize or destroy it. (FM 101-5-1)

3.2.1.3.3.1.1 Hardened (EKMSP) – The ability to kinetically engage moving targets that are reinforced (with armor, concrete, dirt, etc.) to protect against blast, heat, or radiation.

3.2.1.3.3.1.2 Soft (EKMSP) – The ability to kinetically engage moving targets that are not protected against attack.

3.2.1.3.3.1.3 Chemical, Biological, Radiological and Nuclear (EKMSP) – The ability to kinetically engage targets that are moving at the time of decision to engage and which include hazardous materials and capabilities associated with chemical, biological, radiological, or nuclear weapons production or storage.

3.2.1.3.3.2 Area (EKMS) – The ability to kinetically engage a large moving target within a region.

3.2.1.3.3.2.1 Hardened (EKMSA) – The ability to kinetically engage moving targets that are reinforced (with armor, concrete, dirt, etc.) to protect against blast, heat, or radiation.

3.2.1.3.3.2.2 Soft (EKMSA) – The ability to kinetically engage targets that are not protected against attack.

3.2.1.3.4 Underground (EKM) – The ability to kinetically engage moving targets beneath the surface of the earth.

3.2.1.3.4.1 Soft (EKMU) – The ability to kinetically engage targets that are not protected against attack.

3.2.1.3.4.2 Chemical, Biological, Radiological and Nuclear (EKMU) – The ability to kinetically engage targets that are moving at the time of decision to engage and which include hazardous materials and capabilities associated with chemical, biological, radiological, or nuclear weapons production or storage.

3.2.1.3.5 Underwater (EKM) – The ability to kinetically engage moving targets below the surface of a body of water.

3.2.1.3.5.1 Surf Zone (EKMU) – The ability to kinetically engage targets under water at a depth of 0-10 feet.

3.2.1.3.5.2 Very Shallow (EKMU) – The ability to kinetically engage targets under water at a depth of 10-40 feet.

3.2.1.3.5.3 Shallow (EKMU) – The ability to kinetically engage targets under water at a depth of 40-200 feet.

3.2.1.3.5.4 Deep Water (EKMU) – The ability to kinetically engage targets under water at depths greater than 200 feet.

3.2.2 Non-Kinetic Means – The ability to create effects that do not rely on explosives or physical momentum. (e.g., directed energy, computer viruses/hacking, chemical, and biological).

3.2.2.1 Fixed Target (ENK) – The ability to non-kinetically engage a geographic area or object that is unable to move. (modified from JP 1-02)

3.2.2.1.1 Surface (ENKF) – The ability to non-kinetically engage targets on the land or water.

3.2.2.1.1.1 Point (ENKFS) – The ability to non-kinetically engage a target of such small dimension that it requires the accurate placement of ordnance in order to neutralize or destroy it. (FM 101-5-1)

3.2.2.1.1.2 Area (ENKFS) – The ability to non-kinetically engage a target consisting of a region rather than a single point. (JP 1-02) This includes circular, linear, and irregular shaped targets.

3.2.2.1.2 Underground (ENKF) – The ability to non-kinetically engage targets beneath the surface of the earth (bunkers, basements, tunnels, caves, etc.).

3.2.2.1.3 Underwater (ENKF) – The ability to non-kinetically engage targets below the surface of a body of water.

3.2.2.2 Stationary Target (ENK) – The ability to kinetically engage an object that could move but is currently not moving. (modified from JP 1-02)

3.2.2.2.1 Surface (ENKS) – The ability to non-kinetically engage targets on the exterior or upper boundary of the land or water.

3.2.2.2.1.1 Point (ENKSS) – The ability to non-kinetically engage a target of such small dimension that it requires the accurate placement of ordnance in order to neutralize or destroy it. (FM 101-5-1)

3.2.2.2.1.2 Area (ENKSS) – The ability to non-kinetically engage a target consisting of a region rather than a single point. (JP 1-02) This includes circular, linear, and irregular shaped targets.

3.2.2.2.2 Underground (ENKS) – The ability to non-kinetically engage targets beneath the surface of the earth (bunkers, basements, tunnels, caves, etc.).

3.2.2.2.3 Underwater (ENKS) – The ability to non-kinetically engage targets below the surface of a body of water.

3.2.2.3 Moving Targets (ENK) – The ability to non-kinetically engage a system, unit, or person that is in the process of moving.

3.2.2.3.1 Air (ENKM) – The ability to non-kinetically engage moving targets in the region beginning at the upper boundary of the land or water and extending upward to the lower boundary of the Earth's ionosphere (approximately 50 KMs).

3.2.2.3.2 Space (ENKM) – The ability to non-kinetically engage moving targets in the region beginning at the lower boundary of the Earth's ionosphere (approximately 50 KMs) and extending outward. (JP 1-02)

3.2.2.3.3 Surface (ENKM) – The ability to non-kinetically engage moving targets on the exterior or upper boundary of the land or water.

3.2.2.3.3.1 Point (ENKMS) – The ability to non-kinetically engage a moving target of such small dimension that it requires the accurate placement of ordnance in order to neutralize or destroy it. (FM 101-5-1)

3.2.2.3.3.2 Area (ENKMS) – The ability to non-kinetically engage a moving target consisting of a region rather than a single point. (JP 1-02) This includes circular, linear, and irregular shaped targets.

3.2.2.3.4 Underground (ENKM) – The ability to non-kinetically engage moving targets beneath the surface of the earth (bunkers, basements, tunnels, caves, etc.).

3.2.2.3.5 Underwater (ENKM) – The ability to non-kinetically engage moving targets below the surface of a body of water.

3.2.2.4 Cyberspace (ENK) – The ability to conduct non-kinetic engagements to attack and defend the interdependent network of information technology infrastructures and the data within them.

3.2.2.4.1 Computer Network Attack – The ability to disrupt, deny, degrade, or destroy information resident in information technology infrastructures, or the information technology infrastructure itself. (derived from CM-0363-08 and JP 1-02)

3.2.2.4.2 Computer Network Defense – The Ability to employ operational defensive measures to counter unauthorized activity within the Department of Defense information systems and information technology infrastructure.

3.2.2.5 Electromagnetic Spectrum (ENK) – The ability to conduct non-kinetic engagements against an adversary's use of the range of electromagnetic radiation.

3.2.2.5.1 Position, Navigation and Timing (ENKES) – The ability to disrupt, deny, degrade or destroy an adversary's use of position, navigation and timing sources.

3.2.2.5.2 Radar (ENKES) – The ability to disrupt, deny, degrade or destroy an adversary's use of radio ranging technology.

3.2.2.5.3 Communications (ENKES) – The ability to disrupt, deny, degrade or destroy an adversary's use of signals technology.

3.2.2.5.4 Intelligence, Surveillance and Reconnaissance (ENKES) – The ability to disrupt, deny, degrade or destroy adversarial intelligence, surveillance and reconnaissance capabilities.

3.2.2.6 Chemical, Biological, Radiological and Nuclear (ENK) – The ability to non-kinetically engage targets which include hazardous materials and capabilities associated with chemical, biological, radiological, or nuclear weapons production or storage.

LOGISTICS

4 Logistics – The ability to project and sustain a logistically ready joint force through the deliberate sharing of national and multi-national resources to effectively support operations, extend operational reach and provide the joint force commander the freedom of action necessary to meet mission objectives.

4.1 Deployment and Distribution – The ability to plan, coordinate, synchronize, and execute force movement and sustainment tasks in support of military operations. Deployment and distribution includes the ability to strategically and operationally move forces and sustainment to the point of need and operate the Joint Deployment and Distribution Enterprise. (JL(D) JIC pg 5 and pages 14-21)

4.1.1 Move the Force – The ability to transport units, equipment and initial sustainment from the point of origin to the point of need and provide JDDE resources to augment or support operational movement requirements of the JFC. (JL(D) JIC pg. 16)

4.1.1.1 Strategically Move the Force – The ability to move forces, equipment and initial sustainment over intertheater distances.

4.1.1.2 Operationally Move the Force – The ability to move forces, equipment, and initial sustainment within theater operational areas and over intratheater distances.

4.1.2 Sustain the Force – The ability to deliver supplies, equipment and personnel replacements to the joint force. (JL(D) JIC pg. 17)

4.1.2.1 Deliver Non-Unit-Related Cargo – The ability to move non-unit-related cargo (supplies and equipment) between point of origin and point of need.

4.1.2.2 Deliver Non-Unit-Related Personnel – The ability to deliver and retrograde non-unit-related personnel between point of origin and point of need.

4.1.3 Operate the Joint Deployment and Distribution Enterprise – The ability to control, conduct and protect Joint Deployment Distribution Enterprise (JDDE) operations and accomplish necessary JDDE capability development activities to operate across the strategic, operational, and tactical continuum with integrated, robust, and responsive physical, information, communication and financial networks. (From JL(D) JIC page 11 and pages 18-21)

4.2 Supply – The ability to identify and select supply sources, schedule deliveries, receive, verify, and transfer product and authorize supplier payments. It includes the ability to see and manage inventory levels, capital assets, business rules, supplier networks and agreements (to include import requirements) as well as assessment of supplier performance.

4.2.1 Manage Supplies and Equipment – The ability to maintain accountability and set retention levels of materiel and equipment.

4.2.2 Inventory Management – The ability to control, cataloging, requirements forecasting, procurement scheduling, distribution, and overhaul (DX/RX) and disposal of materiel.

4.2.3 Manage Supplier Networks – The ability to source requirements from the industrial base to meet routine and surge requirements.

4.3 Maintain – The ability to manufacture and retain or restore materiel in a serviceable condition.

4.3.1 Inspect – The ability to determine faults or verify repairs or determine condition of an item of equipment based on established equipment maintenance and serviceability standards.

4.3.2 Test – The ability to evaluate the operational condition of an end item or subsystem thereof against an established standard or performance parameter.

4.3.3 Service – The ability to conduct preventive maintenance checks and scheduled maintenance to detect, correct or prevent minor faults before these faults cause serious damage, failure, or injury.

4.3.3.1 Activate / Inactivate – The ability to return an item from preservation, storage, or inactive status to an active, serviceable status by means of removal from storage and containers, stripping, inspection, servicing, testing and repair, or replacement of components, assemblies, or subassemblies as required.

4.3.3.2 Reclaim – The ability to process authorized end items, assemblies, or subassemblies to obtain parts or components that are to be retained in operating materials and supplies prior to taking disposal action. Includes demilitarization actions on items prior to disposal.

4.3.4 Repair – The ability to restore an item to serviceable condition through correction of a specific failure or condition.

4.3.5 Rebuild – The ability to recapitalize an item to a standard as nearly as possible to its original condition in appearance, performance, and life expectancy.

4.3.5.1 Modify – The ability to change an item such that one or more measurable characteristics is altered to improve equipment performance, increase reliability, improve supportability, or enhance safety. Modify includes conversion of items to change their mission, performance, or capability.

4.3.5.2 Renovate – The ability to prove, test, evaluate, inspect, and rework ammunition or ordnance items as required for retaining their desired capability.

4.3.6 Calibration – The ability to compare an instrument with an unverified accuracy to an instrument of known or greater accuracy to detect and correct any discrepancy in the accuracy of the unverified instrument.

4.4 Logistics Services – The ability to provide services and functions essential to the technical management and support of the joint force.

4.4.1 Food Service – The ability to plan, synchronize and manage subsistence support to the joint force to include dining facility management, subsistence procurement and storage, food preparation, field feeding and nutrition awareness.

4.4.1.1 Basecamp Feeding – The ability to receive, store, prepare, and serve nutritious meals, authorized enhancements, and supplements in a sanitary expeditionary dining facility environment, based on theater ration cycle and mix, with the ability to project meals to disbursed populations.

4.4.1.2 Forward Unit Feeding – The ability to receive, store, centrally prepare and serve operational rations, authorized enhancements, and supplements under sanitary field feeding conditions to disbursed populations in a tactical field environment.

4.4.1.3 Remote Unit Feeding – The ability to receive, store, and prepare meals, authorized enhancements, and supplements under sanitary field feeding conditions to dispersed populations and return the supporting equipment.

4.4.1.4 Installation Feeding – The ability to receive, store, prepare and serve nutritious meals, authorized enhancements, and supplements in a sanitary garrison dining facility environment based on Service ration cycle and mix, with the ability to project meals to disbursed populations.

4.4.2 Water and Ice Service – The ability to produce, test, store and distribute bulk, packaged and frozen water in an expeditionary environment.

4.4.2.1 Bulk Water (non-potable) – The ability to provide and distribute fresh, brackish, or seawater from storage to point of use that has not been treated or disinfected and has not been approved for human consumption.

4.4.2.2 Bulk Water (potable) – The ability to produce, inspect, and distribute bulk potable water from storage to point of use.

4.4.2.3 Packaged Water (bottled/pouched) – The ability to provide potable bottled/packaged water for individual consumption.

4.4.2.4 Ice Service – The ability to provide block, crushed, and cubed ice to support feeding, medical, mortuary affairs, and individual hydration.

4.4.2.5 Water Reuse – The ability to collect, process and return grey water from showers and laundries for re-use in showers and laundry.

4.4.3 Basecamp Services – The ability to provide shelter, billeting, waste management and common user life support management in an expeditionary environment.

4.4.3.1 Shelter – The ability to provide covered areas and other spaces for industrial operations, administration, and personnel.

4.4.3.2 Billeting – The ability to provide lodging to steady state, surge and ebb populations.

4.4.3.3 Utility Operations – The ability to manage and operate power, environmental control, water, and waste systems.

4.4.4 Hygiene Services – The ability to provide laundry, shower, textile and fabric repair support.

4.4.4.1 Personal Hygiene Services – The ability to provide personal shower and sink facilities and human waste collection and processing for individuals of both sexes in a field environment.

4.4.4.2 Textile Services – The ability to receive, segregate, clean, repair, replace, and return individual clothing, light textile items, and individual equipment (OCIE) in a field environment.

4.5 Operational Contract Support – The ability to orchestrate and synchronize the provision of integrated contract support and management of contractor personnel providing that support to the joint force in a designated operational area.

4.5.1 Contract Support Integration – The ability to synchronize and integrate contract support being executed in a designated operational area in support of the Joint Force.

4.5.2 Contractor Management – The ability to manage and maintain visibility of associated contractor personnel providing support to the Joint Force in a designated operational area.

4.6 Engineering – The ability to execute and integrate combat, general, and geospatial engineering to meet national and JFC requirements to assure mobility, provide infrastructure to position, project, protect, and sustain the joint force, and

enhance visualization of the operational area, across the full spectrum of military operations.

4.6.1 General Engineering – The ability to employ engineering capabilities and activities, other than combat engineering, that modify, maintain, or protect the physical environment. Examples include: the construction, repair, maintenance, and operation of infrastructure, facilities, lines of communication and bases; terrain modification and repair; and selected explosive hazard activities. (J.P. 3-34)

4.6.1.1 Gap Crossing – The ability to enable joint forces to overcome breaks or openings in terrain (dry or wet, natural or man-made) by providing a system of temporary and permanent crossing techniques and equipment.

4.6.1.2 Develop and Maintain Facilities – The ability to develop, rehabilitate, and maintain bases and installations by providing design, real estate, construction and environmental services which extend through final disposition.

4.6.1.3 Establish Lines of Communications – The ability to assess, construct, repair, and improve routes, railroads, intermodal facilities, and supporting infrastructure to allow the speedy flow of personnel, supplies, and equipment into theater and forward to tactical units.

4.6.1.4 Global Access Engineering – The ability to enable theater access by determining and documenting infrastructure capacities, in-situ soils, hydrology, and environmental conditions, and forecast and mitigate limitations to enable deployment and improve throughput capacities.

4.6.1.5 Repair and Restore Infrastructure – The ability to rehabilitate critical infrastructure. This capability includes repairing or demolishing damaged buildings, restoring utilities such as electrical power, and bringing critical facilities such as hospitals, water treatment plants and waste management facilities online.

4.6.1.6 Harden Key Infrastructure and Facilities – The ability to apply site- and threat-adaptable plans and designs, advanced construction techniques and materials in order to enhance the prevention or mitigation of hostile actions against materiel resources, facilities and infrastructure.

4.6.1.7 Master Facility Design – The ability to integrate land use, bills of material and forecasts, and construction requirements that facilitate project execution and developing infrastructure and facilities.

4.6.2 Combat Engineering – The ability to employ engineering capabilities and activities that support the maneuver of land combat forces and that require close support to those forces. Combat engineering consists of three types of capabilities and activities: mobility, countermobility, and survivability. (J.P. 3-34)

4.6.2.1 Defeat Explosive Hazards – The ability to locate and neutralize the full range of enemy and friendly explosive hazards that may impede routine operations and, in particular, decrease mobility or present a threat to force protection. It includes the capability to detect, avoid, and neutralize hazards in concert with mounted or dismounted maneuver (breach) or as part of tactical/operational movement (route clearance).

4.6.2.2 Enhance Mobility – The ability to enable both mounted and dismounted movement and maneuver where and when desired without interruption or delay through complex terrain (ranging from littoral to mountainous areas), built up areas (cities, towns, and villages to include subterranean structures), and complex manmade and natural obstacles to achieve the commander's intent without loss of speed or flexibility.

4.6.2.3 Deny Enemy Freedom of Maneuver – The ability to enable the Joint Force Commander to quickly dominate terrain and modify the physical environment in order to isolate enemy forces, deny key terrain and impede, deny or canalize enemy movement via lethal and non-lethal means.

4.6.2.4 Enhance Survivability – The ability to provide coordinated and synchronized engineer support (including camouflage techniques) and construction to increase force protection and conserve the Joint Force's fighting capabilities and freedom of action.

4.6.3 Geospatial Engineering – The ability to portray and refine data pertaining to the geographic location and characteristics of natural or constructed features and boundaries in order to provide engineer services. Examples include: terrain analyses, terrain visualization, digitized terrain products, nonstandard tailored map products, facility support, and force beddown analysis. (derived from J.P. 3-34)

4.6.3.1 Utilize Geospatial Data – The ability to provide the Joint Force Commander with the foundation layer of the operational environment for use with collaborative decision-support, and terrain analysis tools.

4.6.3.2 Provide Mobility Assessments – The ability to understand a planned area of operations through the development of assessments on aerial and sea ports, transportation networks, cross country mobility, and mobility corridors.

4.7 Installations Support – The ability to provide installation assets and services necessary to support US military forces.

4.7.1 Real Property Life Cycle Management – The ability to provide for the acquisition, operation, sustainment, recapitalization, realignment, and disposal of real property assets to meet the requirements of the force.

4.7.1.1 Provide Installation Assets – The ability to purchase, lease, program for construction, or gain real property installation assets by any other means, including all land, natural resources, anything growing on the land, buildings, structures, housing, stationary mobile facilities, linear structures, firmly attached and integrated equipment (such as light fixtures), plus all "interests" in the property such as easements, oil and mineral rights, or use water and airspace.

4.7.1.2 Facilities Support – The ability to provide functional real property installation assets with utilities – energy, water, and wastewater; contract and real property management; pollution prevention; and essential services throughout natural or manmade disasters.

4.7.1.3 Sustainment of Installation Assets – The ability to assess, preserve, maintain, and repair any built, natural, and cultural installation assets. Includes regular surveys and inspections, and measures to comply with environmental and conservation requirements.

4.7.1.4 Recapitalization of Installation Assets – The ability to perform the restoration, modernization, and replacement of installation assets to meet tenant requirements and comply with safety and environmental laws to include cleanup of contamination from hazardous substances, pollutants, and contaminants.

4.7.1.5 Disposal of Installation Assets – The ability to conduct demolition and disposal activities resulting in the removal of installation assets from the asset inventory by any means, with consideration of the impact to local communities.

4.7.1.6 Economic Adjustment Activities – The ability to provide and manage activities to assist communities impacted by changes in the Defense footprint caused by base closures, realignments, expansions, or significant changes in Defense industry employment. Includes assessing economic hardships, evaluating alternatives for local recovery, identifying resource requirements, and assisting in creating action plans.

4.7.2 Installation Services – The ability to deliver selected services not related to real property (or personnel services) to meet the requirements of the installation population and mission.

4.7.2.1 Security Services – The ability to provide law enforcement functions and physical security to an installation.

4.7.2.1.1 Law Enforcement – The ability to provide the functions of Law Enforcement (LE) operations.

4.7.2.1.2 Base Physical Security – The ability to provide Physical Security operations and support functions to safeguard personnel, prevent unauthorized access to equipment, installations/ facilities, material and documents, and to safeguard them against espionage, sabotage, damage and theft.

4.7.2.2 Emergency Services – The ability to protect and rescue people, facilities, aircrews, aircraft and other assets from loss due to accident or disaster.

4.7.2.3 Installation Safety – The ability to prevent and respond to accidents and mitigate risk to the lowest acceptable level.

4.7.2.4 Base Support Vehicles and Equipment – The ability to manage the procurement, dispatch, operation, maintenance, and disposal of all non-tactical, government-owned and –controlled vehicles and transportation related equipment used for the day-to-day support of installation operations.

4.7.2.5 Housing Services – The ability to manage housing or billeting assignments, referrals, and physical asset management, and provide necessary furnishings and equipment.

4.7.2.6 Airfield Management – The ability to provide airfield services including weather, air traffic control, terminal/special use airspace management, airfield and flight management, cargo and passenger services, and transient aircraft support.

4.7.2.7 Port Services – The ability to perform and provide port services including ship movements, berth days, magnetic silencing, cargo handling, transient vessel support, and waterborne spill response at DoD and commercial seaports.

4.7.2.8 Range Management – The ability to safely maintain, schedule, control and monitor ranges, and uses associated with airs pace/sea space and safety zone environments related to fixed point (non-maneuver) ranges.

COMMAND AND CONTROL

5 Command and Control – The ability to exercise authority and direction by a properly designated commander or decision maker over assigned and attached forces and resources in the accomplishment of the mission.

5.1 Organize – The ability to align or synchronize interdependent and disparate entities, including their associated processes and capabilities to achieve unity of effort.

5.1.1 Establish and Maintain Unity of Effort with Mission Partners – The ability to foster and maintain cooperative relations with mission partners.

5.1.1.1 Cultivate Relations with Mission Partners – The ability to facilitate professional and personal relationships with military and civilian counterparts.

5.1.1.2 Cultivate Coordination with Partner Organizations – The ability to facilitate and sustain organizational synergy with military and civilian counterparts.

5.1.2 Structure Organization to Mission – The ability to dynamically organize elements and define roles, responsibilities, and authorities.

5.1.2.1 Define Structure – The ability to organize forces to best accomplish the mission.

5.1.2.2 Assess Capabilities – The ability to determine existing and future functional competencies.

5.1.2.3 Assign Roles and Responsibilities – The ability to assign and refine appropriate decision authorities and accountability between leaders and subordinates.

5.1.2.4 Integrate Capabilities – The ability to understand, select and synthesize contributing functional competencies to achieve optimized action.

5.1.2.5 Establish Commander's Expectations – The ability to provide command priorities, intent, guidance, and standards to planning, execution, and assessment.

5.1.3 Foster Organizational Collaboration – The ability to establish internal structures and processes and external interfaces that facilitate interaction and coordination.

5.1.3.1 Establish Collaboration Policies – The ability to promulgate authoritative direction that facilitates the exchange of information and ideas.

5.1.3.2 Establish Collaborative Procedures – The ability to define and develop the mechanism and methodologies to ensure mission partners fully leverage shared information and the exchange of ideas.

5.2 Understand – The ability to individually and collectively comprehend the implications of the character, nature, or subtleties of information about the environment and situation to aid decision-making.

5.2.1 Organize Information – The ability to discover, select, and distill information within an established context.

5.2.1.1 Compile Information – The ability to gather information from available sources (e.g. friendly, adversary, neutral, environmental, sociological)

5.2.1.2 Distill Information – The ability to filter and refine the discovery and selection of information.

5.2.1.3 Disseminate Information – The ability to present the refined information to enable comprehension.

5.2.2 Develop Knowledge and Situational Awareness – The ability to apply context, experience, and intuition to data and information to derive meaning and value. (Derived from NCE JFC)

5.2.2.1 Understand Implications – The ability to derive meaning and significance of selected information in a given context (within specific time and geographic constraints) and to assess the consequences of potential decisions.

5.2.2.2 Analyze Information – The ability to methodically examine information by decomposing it into its constituent parts and studying their interrelations in a given context.

5.2.2.3 Define Knowledge Structure – The ability to organize information into cogent, actionable context.

5.2.3 Share Knowledge and Situational Awareness – The ability to communicate synthesized information and context. (Derived from NCOE JIC)

5.2.3.1 Define Associated Community – The ability to identify relevant stakeholders.

5.2.3.2 Establish Collective Meaning (collaboration) – The ability to form collective perspective of the situation.

5.2.3.3 Prepare Distributable Context – The ability to share cognizant, user-tailorable conclusions with stakeholders.

5.3 Planning – The ability to establish a framework to employ resources to achieve a desired outcome or effect.

5.3.1 Analyze Problem – The ability to review and examine all available information to determine necessary actions.

5.3.1.1 Analyze Situation – The ability to evaluate synthesized situational awareness, including intelligence assessments, environmental condition, and force assessments to prepare strategies or plans.

5.3.1.2 Document Problem Elements – The ability to produce a description of the situation based on the analysis of the guidance and synthesized information.

5.3.2 Apply Situational Understanding – The ability to use synthesized information and awareness applicable to a given situation or environment to further understand the problem.

5.3.2.1 Evaluate Operational Environment – The ability to assess the circumstances and characteristics of a situation.

5.3.2.2 Determine Vulnerabilities – The ability to assess existing and potential weakness.

5.3.2.3 Determine Opportunities – The ability to assess existing and potential circumstances leading to success.

5.3.3 Develop Strategy – The ability to create a framework that synchronizes and integrates the resources available to achieve a desired outcome or effect.

5.3.3.1 Determine End State – The ability to unambiguously define a set of desired final objective conditions.

5.3.3.2 Develop Assumptions – The ability to analyze and build suppositions on the current situation or a presupposition on the future course of events, in the absence of positive proof. (Derived from JP1-02)

5.3.3.3 Develop Objectives – The ability to clearly define decisive and obtainable goals towards which every operation should be directed in accomplishment of the mission. (Derived from JP5-0)

5.3.4 Develop Courses of Action – The ability to build and refine sequences of activities to achieve a desired outcome or effect.

5.3.4.1 Assess Available Capabilities – The ability to determine the adequacy and readiness of the current resources and the means to accomplish a defined objective.

5.3.4.2 Understand Objectives – The ability to comprehend intent and guidance within a given situation.

5.3.4.3 Develop Options – The ability to create a potential or series of potential activities or actions to achieve the assigned objectives.

5.3.5 Analyze Courses of Action – The ability to evaluate potential solutions to determine likelihood of success.

5.3.5.1 Establish Selection Criteria – The ability to define the valuation metrics to compare COAs.

5.3.5.2 Evaluate Courses of Actions – The ability to assess the strengths and weaknesses of each proposed COA (e.g., exercises, wargames, modeling and simulation, etc).

5.4 Decide – The ability to select a course of action informed and influenced by the understanding of the environment or a given situation.

5.4.1 Manage Risk – The ability to recognize and balance the likelihood and consequences of undesired effects with the desired outcomes/effects.

5.4.2 Select Actions – The ability to choose a prudent idea or set of ideas that leads to a desired outcome or end-state within a defined set of constraints.

5.4.2.1 Select Course of Action – The ability to choose the sequence of activities that most efficiently and effectively achieves the desired objective.

5.4.2.2 Select Plan – The ability to choose a framework to employ resources, according to established selection criteria.

5.4.3 Establish Rule Sets – The ability to construct directives that delineate circumstances and limitations for actions.

5.4.4 Establish Intent and Guidance – The ability to formulate a concise expression of purpose, methods, acceptable risk, and desired end state.

5.4.5 Intuit – The ability to make instinctive assessments and preemptive decisions to adjust to and/or shape change.

5.5 Direct – The ability to employ resources to achieve an objective.

5.5.1 Communicate Intent and Guidance – The ability to promulgate a concise expression of the operational purpose, assessment of acceptable operational risk, and guidance to achieve the desired end state.

5.5.1.1 Issue Estimates – The ability to provide current situation, development, or trend analysis and interpret the significance, appraise the future possibilities and forecast the prospective results of the various actions that could be undertaken (DoD Dictionary).

5.5.1.2 Issue Priorities – The ability to provide prioritized elements to all required organizations and assets.

5.5.1.3 Issue Rule Sets – The ability to provide all directives applicable to subordinate organizations and assets.

5.5.1.4 Provide Concept of Operations – The ability to distribute leadership's initial determination of a concept of operations, leader expectations, and follow-on adjustments, as necessary, for achieving the mission.

5.5.1.5 Provide Warnings – The ability to communicate and then gain acknowledgement of dangers implicit in a wide spectrum of activities by potential opponents.

5.5.1.6 Issue Alerts – The ability to forewarn military decision makers, operating location population and civilian authorities of immediate threats and other dangers.

5.5.2 Task – The ability to direct actions and resources.

5.5.2.1 Synchronize Operations – The ability to arrange actions through established links with mission partners to ensure coordination of operations.

5.5.2.2 Issue Plans – The ability to provide relevant plans.

5.5.2.3 Issue Orders – The ability to provide directives.

5.5.3 Establish Metrics – The ability to establish objective criteria to assess performance and results.

5.5.3.1 Establish Measures of Performance – The ability to establish criteria or conditions used to measure task accomplishment.

5.5.3.2 Establish Measures of Effectiveness – The ability to establish criteria used to assess changes in system behavior, capability, or operational environment that are tied to measuring the attainment of an end state, achievement of an objective, or creation of an effect.

5.6 Monitor – The ability to adequately observe and assess events/effects of a decision.

5.6.1 Assess Compliance with Guidance – The ability to determine if performance adheres to established parameters and expectations.

5.6.1.1 Assess Employment of Forces – The ability to determine if forces have been applied to assigned objectives.

5.6.1.2 Assess Manner of Employment – The ability to determine if force employment has followed established guidance.

5.6.2 Assess Effects – The ability to analyze, track, and measure the results of actions taken.

5.6.3 Assess Achievement of Objectives – The ability to determine when the desired end-state has been reached.

5.6.4 Assess Guidance – The ability to determine if direction is achieving the desired end-state and is appropriate for the situation.

NET-CENTRIC

6 Net-Centric – The ability to provide a framework for full human and technical connectivity and interoperability that allows all DoD users and mission partners to share the information they need, when they need it, in a form they can understand and act on with confidence, and protects information from those who should not have it.

6.1 Information Transport – The ability to transport information and services via assured end-to-end connectivity across the NC environment.

6.1.1 Wired Transmission – The ability to transfer data or information with an electrical/optical conductor.

6.1.1.1 Localized Communications – The ability to disseminate, transmit, or receive voice, data, video and integrated telecommunications via wire or optical means within the confines of a platform or an installation (e.g., command post, post, camp, station, base, installation, headquarters, or Federal building).

6.1.1.2 Long-Haul Telecommunications – The ability to disseminate, transmit, or receive voice, data, video and integrated telecommunications via wire or optical means to, from and between platforms and/or installations (e.g., command post, post, camp, base, stations or federal buildings).

6.1.2 Wireless Transmission – The ability to transfer data or information without an electrical/optical conductor.

6.1.2.1 Line of Sight – The ability to exchange data or information via electromagnetic spectrum within line of sight.

6.1.2.2 Beyond Line of Sight – The ability to exchange data or information via electromagnetic spectrum beyond line of sight.

6.1.3 Switching and Routing – The ability to move data and information end to end across multiple transmission media.

6.1.3.1 Communication Bridge – The ability to interface two or more common communications media or networks.

6.1.3.2 Communication Gateway – The ability to interface two or more disparate communications media or networks.

6.2 Enterprise Services – The ability to provide to all authorized users awareness of and access to all DoD information and DoD-wide information services.

6.2.1 Information Sharing / Computing – The ability to provide physical and virtual access to hosted information and data centers across the enterprise based on established data standards.

6.2.1.1 Information Sharing – The ability to establish a trusted environment that promotes information sharing, extends the DoD Information Enterprise to DoD mission partners and accommodates unanticipated partners and events.

6.2.1.2 Computing Infrastructure – The ability to acquire, store, process, manage, control and display data or information (shared and/or distributed).

6.2.1.2.1 Shared Computing Infrastructure – The ability to provide computing processing and storage resources that can be used by more than one component, community of Interest, program, or DoD user.

6.2.1.2.2 Distributed Computing – The ability to provide a virtual computing capability to an end user or application through federation of distributed, location-independent computing resources.

6.2.2 Core Enterprise Services – The ability to provide awareness of, access to and delivery of information on the GIG via a small set of CIO mandated services.

6.2.2.1 User Access (Portal) – The ability to access user defined DoD Enterprise Services through a secure single entry point.

6.2.2.2 Collaboration – The ability to conduct synchronous and asynchronous communications and interaction across the enterprise, including voice, data, video, and manipulated visual representation.

6.2.2.3 Content Discovery – The ability to identify, search for, or locate relevant information.

6.2.2.4 Content Delivery – The ability to accelerate delivery and improve reliability of enterprise content and services, by optimizing the location and routing of information.

6.2.2.5 Common Identity Assurance Services – The ability to establish and deploy common identity assurance services across the enterprise.

6.2.2.6 Enterprise Messaging – The ability to perform electronic messaging between users and organizational entities across the enterprise, including providing customer support.

6.2.2.7 Directory Services – The ability to provide, operate, and maintain a global directory of users, to include directory synchronization with other lower-level systems and information integrity.

6.2.3 Position, Navigation and Timing – The ability to determine accurate and precise location, orientation, time and course corrections anywhere in the battlespace and to provide timely and assured PNT services across the DoD enterprise.

6.2.3.1 Provide Position, Navigation and Timing Information – The ability to provide and control temporal and spatial reference information.

6.2.3.2 Utilize Position, Navigation and Timing Information – The ability to acquire and apply temporal and spatial reference information to produce continuous PNT solutions.

6.3 Net Management – The ability to configure and re-configure networks, services and the underlying physical assets that provide end-user services, as well as connectivity to enterprise application services.

6.3.1 Optimized Network Functions and Resources – The ability to provide DoD with responsive network functionality and dynamically configurable resources, to include allocation of required bandwidth, computing and storage.

6.3.1.1 Network Resource Visibility – The ability to determine real time status and effectiveness of network services and resources.

6.3.1.2 Rapid Configuration Change – The ability to rapidly configure and reconfigure enterprise services and resources in concert with the established CONOPS.

6.3.2 Deployable Scalable and Modular Networks – The ability to design, assemble, transport, and establish mission-scaled networks from adaptable components network modules.

6.3.3 Spectrum Management – The ability to synchronize, coordinate, and manage all elements of the electromagnetic spectrum through engineering and administrative tools and procedures.

6.3.3.1 Spectrum Monitoring – The ability to monitor and characterize the electromagnetic environment.

6.3.3.2 Spectrum Assignment – The ability to identify spectrum requirements; evaluate electromagnetic environmental effects (E3); and dynamically plan, allot, and modify frequency assignments to exploit available spectrum.

6.3.3.3 Spectrum Deconfliction – The ability to dynamically predict, detect, and mitigate frequency interference.

6.3.4 Cyber Management – The ability to assure network support for all DoD missions through the synchronization, deconfliction, coordination, and awareness of all elements of computer network operations.

6.4 Information Assurance – The ability to provide the measures that protect, defend and restore information and information systems.

6.4.1 Secure Information Exchange – The ability to secure dynamic information flow within and across domains.

6.4.1.1 Assure Access – The ability to identify and authenticate individuals, groups, and entities and provide authorization to services and information.

6.4.1.2 Assure Transfer – The ability to exchange authentic data, information, and knowledge between authorized individuals, groups, and entities.

6.4.2 Protect Data and Networks – The ability to anticipate and prevent successful attacks on data and networks.

6.4.2.1 Protect Against Network Infiltration – The ability to prevent unauthorized access.

6.4.2.2 Protect Against Denial or Degradation of Services – The ability to prevent or contain activities which may degrade or deny authorized use of network resources.

6.4.2.3 Protect Against Disclosure or Modification of Data – The ability to prevent or contain activities which may expose or modify data.

6.4.3 Respond to Attack / Event – The ability to maintain services while under cyber-attack, recover from cyber-attack, and ensure availability of information and systems.

6.4.3.1 Detect Events – The ability to identify anomalous activities and behavior.

6.4.3.2 Analyze Events – The ability to diagnose anomalous activities and behavior by determining cause, characterizing and assessing impact.

6.4.3.3 Respond to Incidents – The ability to take action to mitigate the impact of anomalous activities and behavior.

PROTECTION

7 Protection – The ability to prevent/mitigate adverse effects of attacks on personnel (combatant/non-combatant) and physical assets of the United States, allies and friends.

7.1 Prevent – The ability to neutralize an imminent attack or defeat attacks on personnel (combatant/non-combatant) and physical assets.

7.1.1 Prevent Kinetic Attack – The ability to defeat attacks being delivered by systems which rely upon physical momentum.

7.1.1.1 Above Surface (PK) – The ability to defeat kinetically delivered attacks in air and space.

7.1.1.1.1 Maneuvering (PKA) – The ability to defeat kinetically delivered attacks that can change speed, direction or altitude based on internal or external guidance.

7.1.1.1.2 Non-Maneuvering (PKA) – The ability to defeat kinetically delivered attacks that cannot change speed, direction or altitude based on internal or external guidance.

7.1.1.2 Surface (PK) – The ability to defeat kinetically delivered attacks on the exterior or upper boundary of the land or water.

7.1.1.2.1 Maneuvering (PKS) – The ability to defeat kinetically delivered attacks that can change speed or direction based on internal or external guidance.

7.1.1.2.2 Non-Maneuvering (PKS) – The ability to defeat kinetically delivered attacks that cannot change speed or direction based on internal or external guidance.

7.1.1.3 Sub-Surface Kinetic (PK) – The ability to defeat kinetically delivered attacks beneath the surface of the earth (bunkers, basements, tunnels, caves, etc.) or beneath the surface of a body of water.

7.1.1.3.1 Maneuvering (PKSS) – The ability to defeat kinetically delivered attacks that can change speed, direction or depth based on internal or external guidance.

7.1.1.3.2 Non-Maneuvering (PKSS) – The ability to defeat kinetically delivered attacks that cannot change speed, direction or depth based on internal or external guidance.

7.1.2 Prevent Non-kinetic Attack – The ability to defeat attacks being delivered by systems which do not rely upon physical momentum.

7.1.2.1 Above Surface (PN) – The ability to defeat non-kinetically delivered attacks in air and space.

7.1.2.2 Surface (PN) – The ability to defeat non-kinetically delivered attacks on the exterior or upper boundary of the land or water.

7.1.2.3 Sub-Surface (PN) – The ability to defeat non-kinetically delivered attacks beneath the surface of the earth (bunkers, basements, tunnels, caves, etc.) or beneath the surface of a body of water.

7.2 Mitigate – The ability to minimize the effects and manage the consequence of attacks (and designated emergencies on personnel and physical assets.

7.2.1 Mitigate Lethal Effects – The ability to minimize the effects of attacks or designated emergencies which have the potential to kill personnel and destroy physical assets.

7.2.1.1 Chemical (ML) – The ability to minimize the effects of chemical attacks which have the potential to kill personnel and destroy physical assets.

7.2.1.2 Biological (ML) – The ability to minimize the effects of biological attacks which have the potential to kill personnel and destroy physical assets.

7.2.1.2.1 Contagious (MLB) – The ability to minimize the effects of contagious biological attacks which have the potential to kill personnel and destroy physical assets.

7.2.1.2.2 Non-Contagious (MLB) – The ability to minimize the effects of non-contagious biological attacks which have the potential to kill personnel and destroy physical assets.

7.2.1.3 Radiological (ML) – The ability to minimize the effects of radiological attacks which have the potential to kill personnel and destroy physical assets.

7.2.1.4 Nuclear (ML) – The ability to minimize the effects of nuclear attacks which have the potential to kill personnel and destroy physical assets.

7.2.1.5 Electromagnetic Pulse (ML) – The ability to minimize the effects of electromagnetic pulse attacks which have the potential to kill personnel and destroy physical assets.

7.2.1.6 Explosives (ML) – The ability to minimize the effects of explosive attacks which have the potential to kill personnel and destroy physical assets.

7.2.1.7 Projectiles (ML) – The ability to minimize the effects of projectile attacks which have the potential to kill personnel and destroy physical assets.

7.2.1.8 Directed Energy (ML) – The ability to minimize the effects of directed energy attacks which have the potential to kill personnel and destroy physical assets.

7.2.1.9 Natural Hazards (ML) – The ability to minimize the effects of natural hazards which have the potential to kill personnel and destroy physical assets.

7.2.2 Mitigate Non-Lethal Effects – The ability to minimize the effects of attacks or designated emergencies which do not have the potential to kill personnel and destroy physical assets.

7.2.2.1 Chemical (MN) – The ability to minimize the effects of chemical attacks which do not have the potential to kill personnel and destroy physical assets.

7.2.2.2 Biological (MN) – The ability to minimize the effects of biological attacks which do not have the potential to kill personnel and destroy physical assets.

7.2.2.2.1 Contagious (MNB) – The ability to minimize the effects of contagious biological attacks which do not have the potential to kill personnel and destroy physical assets.

7.2.2.2.2 Non-Contagious (MNB) – The ability to minimize the effects of non-contagious biological attacks which do not have the potential to kill personnel and destroy physical assets.

7.2.2.3 Electromagnetic Pulse (MN) – The ability to minimize the effects of electromagnetic pulse attacks which do not have the potential to kill personnel and destroy physical assets.

7.2.2.4 Explosives (MN) – The ability to minimize the effects of explosive attacks which do not have the potential to kill personnel and destroy physical assets.

7.2.2.5 Projectiles (MN) – The ability to minimize the effects of projectile attacks which do not have the potential to kill personnel and destroy physical assets.

7.2.2.6 Directed Energy (MN) – The ability to minimize the effects of directed energy attacks which do not have the potential to kill personnel and destroy physical assets.

7.2.2.7 Electromagnetic Spectrum (MN) – The ability to minimize the effects of electromagnetic spectrum attacks which do not have the potential to kill personnel and destroy physical assets.

7.2.2.8 Natural Hazards (MN) – The ability to minimize the effects of natural hazards which do not have the potential to kill personnel and destroy physical assets.

7.3 Research and Development – The ability to conduct fundamental research, science, technology, development and experimentation important to all Departmental capabilities and operations

7.3.1 Basic Research – The ability to conduct a systematic study directed toward the discovery of knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific applications.

7.3.2 Applied Research – The ability to conduct a systematic study to understand the means to meet a recognized and specific need.

7.3.3 Advanced Technology Development – The ability to produce innovative and unique components and prototypes that can be integrated into defense systems for field experiments and/or tests in a simulated "or operational" environment "to assess military utility" prior to full development.

BUILDING PARTNERSHIPS

8 Building Partnerships – The ability to set the conditions for interaction with partner, competitor or adversary leaders, military forces, or relevant populations by developing and presenting information and conducting activities to affect their perceptions, will, behavior, and capabilities.

8.1 Communicate – The ability to develop and present information to domestic audiences to improve understanding; and, to develop and present information to foreign audiences to affect their perceptions, will, behavior and capabilities to further U.S. national security or shared global security interests.

8.1.1 Inform Domestic and Foreign Audiences – The ability to develop and present objective information and to correct misinformation or disinformation to domestic and foreign audiences to improve their understanding of the strategies, policies, and operations of the U.S. Government and its partners.

8.1.1.1 Develop Objective Information – The ability to develop U.S. Government interagency synchronized themes and messages, and associated metrics, for presentation, to clarify, reinforce, or improve domestic or foreign audience's understanding of the strategies, policies, and operations of the U.S. Government and its partners.

8.1.1.2 Identify Misinformation and Disinformation – The ability to identify misinformation and disinformation that degrades the domestic and foreign audience's understanding of the strategies, policies, and operations of the U.S. Government and its partners as well as to recognize and promote favorable information.

8.1.1.3 Deliver and Adjust Information – The ability to use selected senders and media to deliver themes, messages, and objective information in accordance with U.S. government goals and objectives, and, if required, recommend modifications to theme, message, senders or medium.

8.1.2 Persuade Partner Audiences – The ability to develop and present truthful information and motivational appeals to foreign audiences for the purpose of convincing them to accept or support the strategies, policies, and operations of the U.S. Government and its partners.

8.1.2.1 Identify Foreign Audience Attitudes – The ability to identify and comprehend the cultures, social dynamics, and interrelationships of relevant foreign audiences regarding their understanding of the strategies, policies, objectives, and operations of the U.S. Government and its partners considering the political milieu, adversary domestic politics, partner reaction and US domestic considerations.

8.1.2.2 Develop Cognitive Programs and Products – The ability to develop objective, U.S. Government interagency-synchronized themes and messages, with associated metrics, which will persuade foreign audiences to accept and support the strategies, policies, and operations of the U.S. Government and its partners.

8.1.2.3 Deliver and Adjust Persuasive Content – The ability to use selected senders and media to deliver themes and messages in accordance with U.S. government goals and objectives, and, if required, recommend modification to theme, message, senders or medium.

8.1.3 Influence Adversary and Competitor Audiences – The ability to develop and present truth-based information to competitor and adversary audiences to prompt them to react in a manner that is favorable to U.S. interests.

8.1.3.1 Identify Adversary and Competitor Attitudes – The ability to identify beliefs, perceptions and reactions of adversary and competitor audiences relevant to the strategies, policies, objectives and operations of the U.S. Government and its partners considering the political milieu, adversary domestic politics, partner reaction and US domestic considerations.

8.1.3.2 Develop Influential Programs and Products – The ability to develop U.S. Government interagency synchronized themes, messages, information, indicators, with associated metrics, to cause adversary and competitor audiences to react in a manner that is favorable to U.S. interests.

8.1.3.3 Deliver and Adjust Influential Content – The ability to use selected senders and media to deliver themes, messages, information, and indicators to cause behavioral activities that accord with U.S. government goals and objectives and, if required, recommend modification to theme, message, senders or medium.

8.2 Shape – The ability to conduct activities to affect the perceptions, will, behavior, and capabilities of partner, competitor, or adversary leaders, military forces, and relevant populations to further U.S. national security or shared global security interests.

8.2.1 Partner with Governments and Institutions – The ability to establish or strengthen formal or informal relationships with domestic and foreign institutions, countries, or populations to further U.S. national security or shared global security interests.

8.2.1.1 Engage Partners – The ability to interact with selected domestic and foreign institutions, countries, or populations under available identified and aligned authorities and resources authorities to facilitate development of formal or informal relationships.

8.2.1.2 Develop Partnership Agreements – The ability to negotiate and establish partnership agreements based on prioritized relationships, containing

measurable objectives, with domestic and foreign institutions, organizations, and governments.

8.2.2 Provide Aid to Foreign Partners and Institutions – The ability to provide assistance, materiel, or services to foreign partners or institutions for the purpose of advancing U.S. national security or shared global security interests.

8.2.2.1 Identify Aid Requirements – The ability to identify requirements and required resources to provide assistance to foreign partners or institutions.

8.2.2.2 Supply Partner Aid – The ability to facilitate the delivery and receipt of aid in a manner that advances partnership goals and national security interests.

8.2.3 Build the Capabilities and Capacities of Partners and Institutions – The ability to assist domestic and foreign partners and institutions with the development of their capabilities and capacities – for mutual benefit – to address U.S. national or shared global security interests.

8.2.3.1 Determine Partner Requirements – The ability to identify and prioritize the specific type and magnitude of partner capability and capacity needed to address shared goals.

8.2.3.2 Enhance Partner Capabilities and Capacities – The ability to facilitate the development of partner capabilities and capacities in a manner that advances partnership goals and mutual interests.

8.2.4 Leverage Capacities and Capabilities of Security Establishments – The ability to stimulate foreign governments and institutions to employ capabilities that complement or assist the U.S. in furthering its national security or shared global security interests.

8.2.4.1 Identify Foreign Security-Related Capabilities – The ability to identify capabilities of governments and institutions that may complement or assist the U.S. in furthering its national security or shared global security interests.

8.2.4.2 Determine Utility of Foreign Security-Related Capabilities – The ability to understand and evaluate the actions and incentives necessary to access the capabilities of foreign governments and institutions.

8.2.4.3 Stimulate the Use of Foreign Security-Related Capabilities – The ability to facilitate the employment of foreign capabilities that complement or assist the U.S. in furthering its national security or shared global security interests.

8.2.5 Strengthen Global Defense Posture – The ability to develop a network of host-nation relationships activities, and footprint of facilities and forces through decision-

making and diplomatic efforts which enable relevant and flexible forward U.S. military presence for contending with uncertainty and shaping the strategic environment.

CORPORATE MANAGEMENT AND SUPPORT

9 Corporate Management and Support – The ability to provide strategic senior level, enterprise-wide leadership, direction, coordination, and oversight through a chief management officer function.

9.1 Advisory and Compliance – The ability to provide advice, counsel, review, inspection and evaluation of policies, standards, systems, procedures and internal controls to ensure compliance with statutory and regulatory requirements and to propose changes to existing requirements.

9.1.1 Advice and External Matters – The ability to provide advice on and manage all matters and services (domestic and international) performed within, or involving DoD to establish and oversee DoD policies and standards on matters including but not limited to Legal, Legislative, and the Media.

9.1.1.1 Legal Matters – The ability to support decision makers on all civil, acquisition, fiscal, military, international, and operational law issues.

9.1.1.2 Legislative Matters – The ability to advise and assist the Department of Defense leaders on all issues involving Congressional testimony or reporting.

9.1.2 Audit, Inspection and Investigation – The ability to understand and monitor matters relating to effective operations of DoD with particular regard to internal review activities.

9.1.2.1 Audits –The ability to analyze the control of DoD resources to ensure compliance and to provide recommendations for improvement.

9.1.2.2 Inspections – The ability to perform inspection of DoD personnel and property, particularly as relates to operational readiness.

9.1.2.3 Investigations – The ability to thoroughly examine issues raised by audits and investigations or by credible allegations including, but not limited to, negligence, misconduct, or misappropriation of funding.

9.1.3 Operational Test and Evaluation – The ability to understand and monitor matters relating to the operational effectiveness, suitability and survivability of systems in their expected combat environment.

9.2 Strategy and Assessment – The ability to establish the direction and priority of activities that DoD must do in support of its Constitutional responsibilities.

9.2.1 Strategy Development – The ability to assess the security environment, establish a DoD direction, strategic goals, priorities, objectives and guidance. Includes

enterprise-level planning activities to determine the integrated and balanced military forces and Joint force capabilities needed to accomplish the DoD strategy.

9.2.2 Capabilities Development – The ability to translate, validate and prioritize capability and capacity requirements or gaps and acceptable areas to increase risk to support DoD strategy.

9.2.3 Enterprise-Wide Assessment – The ability to continually monitor the environment, examine progress towards and achievement of DoD strategic goals and priorities, and inform future strategy development or implement necessary corrective actions to stay on course.

9.2.4 Studies and Analyses – The ability to conduct reviews with appropriate rigor to improve and support policy development, decision making, management, and administration of DoD capabilities, programs and activities.

9.3 Information Management – The ability to establish, manage and oversee policies, standards and assessment mechanisms with regard to Information Technology (IT) architecture, data, security, and information sharing.

9.3.1 Enterprise Architecture – The ability to provide oversight and policy guidance to ensure compliance with standards for developing, maintaining, and implementing sound, integrated and interoperable architectures across the Department.

9.4 Acquisition – The ability to organize and execute the activities necessary to provide materiel for DoD operations.

9.4.1 Acquisition Program Execution – The ability to set up and run programs, to obtain materiel and services required for DoD activities.

9.4.2 Contracting– The ability and authority to organize and run activities required to legally bind non-DoD resources in support DoD operational requirements.

9.5 Program, Budget and Finance – The ability to direct, supervise, provide advice, formulate policy, and conduct analysis on DoD program, budget, performance, and financial matters, pursuant to DoD strategic goals, objectives, priorities and approved strategies and policies.

9.5.1 Program / Budget and Performance – The ability to direct, supervise, provide advice, formulate policy, analyze, evaluate, and recommend efficient and effective resource allocation and performance targets/measures that support DoD missions, strategic goals, objectives, priorities, and approved strategies and policies including the ability to direct, formulate, justify, and present the costs, efficiency, effectiveness, and capabilities of DoD programs and Defense budgets timely and accurately.

9.5.2 Accounting and Finance – The ability to supervise, direct, advise, formulate policy, and account for the execution of DoD resources, including preparation of auditable financial statements. The ability to direct, supervise, and operate integrated DoD accounting and financial management systems and manage and execute financial operations that provide common DoD support in the areas of finance (payroll, commercial pay, etc), and accounting.

Appendix F Finalist Presentation Outline

Slide Title	Slide Content
Agenda	• Description of technology/capability to be provided • Problem to be solved/shortcoming to be addressed • Transition Fundamentals • Programmatic/Technical Details • Target Acquisition Program • Schedule • Funding • Contacts • Confirmation of Commitment
Introduction	• Brief description of the technology • Summarize what this project will provide to the program of record. • "So What" (15 words or less - what advantage (tactical or strategic) does this capability provide)
Problem Statement	• Explanation of the current situation (usually expressed as a problem or shortcoming), and what TTI funding (list funding amount) will be used for in bringing a corrective solution to fruition • Include the causes or reasons for the current problem/predicament (evolving threat, ageing equipment, technology breakthrough, etc.) • Describe the impact of the problem in terms of reduced operational effectiveness (e.g., warfighting capability or mission accomplishment) or efficiency (e.g., total ownership cost)
Transition Fundamentals	• Specific, technical description of what the S&T Program Manager intends to develop for transition to the primary acquisition program, to include numbers of prototypes or test items. Description should include delivery dates, delivery mechanism (purchase, loan, given to program, etc.) • Describe the seminal Transition Event and when it will happen. Also provide the number of units (or some other quantitative metric) that will be procured with the new technology transitioned. Indicate the consequence, or alternative action to be taken if the TTI transition funding is not implemented (what is your Plan B to get the solution transitioned)

Slide Title	Slide Content
Technical Details and Programmatics	• Current Status of Technology - summarize the current state of the development of the technology/capability. Identify primary areas where additional development is required. • Provide an estimate of the Technology Readiness Level (TRL) for each technology/product need identified utilizing a systems approach for hardware and software as the measure of technical maturity and indication of transition readiness (include supporting justification in backups). Provide dates when each higher TRL rating is expected to be achieved. • Risk Analysis. Major areas of risk, prioritized, with planned mitigation activities. Include technical, producibility, affordability, sustainability, cost, and schedule risks. **Address integration risks with the program of record and associated challenges.** • Technology Development Strategy. Outline planned approach. Describe current efforts and efforts required beyond those currently underway. Detail integration plans if multiple projects are planned. Include planned ATD or ACTD developments, if applicable. • Key Measures of Transition Readiness. Identify the key parameters or attributes that will be used as exit criteria to measure whether or not the technology/capability effort is proceeding as scheduled. Include parameters to be tracked, current state, interim progress estimates and final objective.

Slide Title	Slide Content
Target Acquisition Program	• Brief description of the acquisition program intended to receive the technology/capability o Include major program objectives, ACAT level, current phase of acquisition life cycle, next milestone decision review (and anticipated date), and projected initial operational capability date • Acquisition Program Technology Need. o Brief description of the benefit this technology/capability will bring to the acquisition program, or need satisfied. Identify the technology needs of the acquisition program that S&T is expected to provide. o Capability Requirement Basis - identify the governing source of the capability requirement: the Initial Capabilities Document (ICD), Capability Development Document (CDD), or other official reference documenting the capability need o Relate the benefit to the ICD, CDD, Key Performance Parameters (KPP), etc. o Include need dates for specific capabilities • Integration Strategy. Describe the process for integrating the technology/capability into the acquisition program. Include the following elements of the acquisition strategy: o Evolutionary acquisition, block upgrade, etc. o Required contractor-to-contractor agreements o Acquisition Program Element (PE) numbers funding the transition o Annual PE funding levels committed to the transition program o Transition FY
Program Plan	• Show major activities/efforts of the technology/capability technology development activity, with milestones.
Funding	• Show TTI funding requirements, associated component cost share (with PE), all follow-on procurement (with PE) • Relate funding to project events/schedule and major milestones/activities • Provide current status of all Component funding
Contacts	• Program Manager/Project Officer. Identify the program manager and the individual in the program office responsible for day-to-day management, with contact information, concerning the technology/capability. • Technology Manager. Identify the individual designated by either the S&T activity or the source technology program office, PM or PEO to be the coordinator and day-to-day manger of the development of the technology/capability. • Resource Sponsor/Requirements Officer. Identify the resource sponsor and requirements officer responsible for resourcing and establishing requirements for the capability. • Include contact information for all

Slide Title	Slide Content
Commitment	• Statement conveying the level of commitment. For example: *[Example - "Upon successful demonstration of key performance requirements (exit criteria), appropriate name acquisition program office will integrate XXX (product S&T organization will deliver) into appropriate name (acquisition program that will integrate the deliverable) commencing in FYXX (transition year)."* • "We will have a Technology Transition Agreement signed by _____ (S&T organization responsible authority) and _____ (Acquisition organization responsible authority) forwarded to the Office of Technology Transition by _____
Program Quad Chart	Use quad that was submitted with the proposal with any fact-of-life changes

Appendix G Elements of a Technology Transition Agreement (TTA)

Excerpted from Manager's Guide to Technology Transition in an Evolutionary Acquisition Environment, Appendix D, Defense Procurement and Acquisition Policy, Office of the Undersecretary of Defense (Acquisition, Technology & Logistics)

No generic template is available for a successful technology transition plan. However, all technology transition plans have elements in common. In general, technology transition plans should have the following elements:

- A technology development outline. This describes the technology development pathway in detail.
- Expected outcomes of the project. The outcomes should be measurable and achievable "exit criteria".
- Funding strategy. The strategy names the resources to be provided according to source, appropriation, program element, amount, and timing.
- Schedule and milestones, including a transition or handoff schedule.
- Identification of the "customer."
- Acquisition strategy and integration plan.
- Issues and risks—for cost, schedule, technical, manufacturability, sustainment.
- Signed "customer" and program manager agreement for funding, schedule, and deliverables.
- "Customer" funding strategy for acquisition and fielding.
- Plan from multiple sources for using the technology, and encouraging innovation in the program.

At the request of TTWG members, OSD developed a guide for their use in building TTAs for TTI projects. It is included as part of this appendix. Department/Agency-developed TTAs that provide the required information will be acceptable and do not need to be reformatted to mirror this guide.

Guide

TTI TTA Guide/Template

1. Introduction

   1.1. **Purpose/Scope**. Provide a brief statement. *[Example - The Program Manager and S&T Organization mutually agree to enter into this Technology Transition Agreement (TTA) for the purpose of defining technology deliverables from the (appropriate name) technologies development program, to (appropriate name) acquisition program. This TTA defines the functional responsibilities and support relationships between the parties signing this agreement. It ensures a clear understanding of the responsibilities of all*

parties to ensure a successful transition of technology from S&T organization to the program of record name.]

1.2. **Summary**. Provide a brief (2-3 paragraphs) overview summarizing what this project will provide to the program of record. An explanation of the current situation (usually expressed as a problem or shortcoming), and what TTI funding (list funding amount) will be used for in bringing a corrective solution to fruition. Include the causes or reasons for the current problem/predicament. Describe the impact of the problem in terms of reduced operational effectiveness (e.g., warfighting capability or mission accomplishment) or efficiency (e.g., total ownership cost). Justify the reason(s) for a technology insertion outside the normal POM cycle. Describe the seminal Transition Event and when it will happen. Also provide the number of units (or some other quantitative metric) that will be procured with the new technology transitioned. Indicate the consequence, or alternative action to be taken if the TTI transition funding is not implemented (what is your Plan B to get the solution transitioned).

2. Basic Transition Agreement.

2.1. **Technology Name**. Name or names of the technology-to-be-transitioned (T2BT). Description of the Technology to be delivered. Include all aliases, prior names, STO numbers or other identifying numbers or acronyms and relationships to any A/JCTDs, ATDs, SBIR, DAC, etc. Indicate if the T2BT is a subset of the underlying STO or S&T program.

2.2. **Description of Technology or Capability to be Delivered**. Specific, technical description of what the S&T Program or Source-Program Manager intends to develop for transition to the primary acquisition program, to include numbers of prototypes or test items. Description should include delivery dates, delivery mechanism (purchase, loan, given to program, etc.) and specific exit criteria concerning the capability to be available at each delivery date.

2.3. **Target Acquisition Program**. Brief description of the acquisition program intended to receive the T2BT. Include major program objectives, ACAT level, current phase of acquisition life cycle, next milestone decision review (and anticipated date), and projected initial operational capability date.

2.4. **Acquisition Program Technology Need**. Brief description of the benefit that this T2BT will bring to the acquisition program, or need satisfied. Identify the technology needs of the acquisition program that S&T is expected to provide.

2.4.1. Relate the benefit to the Initial Capabilities Document (ICD), Capability Development Document (CDD), Key Performance Parameters (KPP), etc.

2.4.2. Include need dates for specific capabilities. Provide any applicable block upgrade roadmap and the dates by which decisions to incorporate the T2BT in an upgrade must be made.

2.4.3. Provide an estimate of the Technology Readiness Level (TRL) for each technology/product need identified utilizing a systems approach for hardware and software as the measure of technical maturity and indication of transition readiness. Coordinate the TRL with the S&T activity or provide contact information for your independent assessor.

2.5. **Integration Strategy**. Describe the process for integrating the T2BT into the acquisition program. Include the following elements of the acquisition strategy:

2.5.1. Evolutionary acquisition, block upgrade, etc. Identify the target insertion points into the acquisition program and describe, in detail, the transition event.

2.5.2. Required contractor-to-contractor agreements

2.5.3. Specify if any unique or specialized infrastructure requirements exist that the T2BT must accommodate (i.e., computer networks, data, etc.)

2.5.4. Acquisition Program Element (PE) numbers funding the transition

2.5.5. Annual PE funding levels committed to the transition program (see Table 1 in Appendix A)

2.5.6. Transition FY

2.5.7. Statement conveying the level of commitment. For example:

2.5.7.1. Commitment: *[Example - "Upon successful demonstration of key performance requirements (exit criteria), (appropriate name) acquisition program office will integrate XXX (product S&T organization will deliver) into (appropriate name) (acquisition program that will integrate the deliverable) commencing in FYXX (transition year)." This integration effort will be funded under PE XXXXXXX, Project XXXX (FYDP budget profile for this acquisition line should be included).]*

2.5.7.2. Intent: *[Example - Upon successful demonstration of key performance requirements (exit criteria), (appropriate name) acquisition program office intends to integrate XXX (product S&T organization is delivering) into (appropriate name) (acquisition program that will integrate the improved capability) commencing in FYXX (transition year) under PE XXXXXXX Project XXXX (FYDP budget profile).]*

2.6. **Program Manager/Project Officer**. Identify the program manager and the individual in the program office responsible for day-to-day management, with contact information, concerning the T2BT.

2.7. **Technology Manager**. Identify the individual designated by either the S&T activity or the source technology program office, PM or PEO to be the coordinator and day-to-day manger of the development of the T2BT.

2.8. **Capability Requirement Basis**. Identify the governing source of the capability requirement: the ICD, CDD, or other official reference documenting the capability need.

2.9. **Resource Sponsor/Requirements Officer**. Identify the resource sponsor and requirements officer responsible for resourcing and establishing requirements for the capability. Include contact information.

3. Technical Details And Programmatics.

3.1. **Current Status of Technology**.

3.1.1. **Status Summary**. Summarize the current state of the development of the T2BT. Identify primary areas where additional development is required. Provide estimate of current Technology Readiness Level (TRL) ratings and your rationale/justification for this estimate. Discuss briefly the Manufacturing Readiness Level (MRL) and the role the maturation of manufacturing processes will play in the successful completion of this project. (Additional information regarding MRLs can be found in the documents embedded in the footnote on this page.[1])

3.1.2. **Risk Analysis**. Major areas of risk, prioritized, with planned mitigation activities. Include technical, producibility, affordability, sustainability, cost, and schedule risks.

3.2. **Technology Development Strategy**. Outline planned approach. Describe current efforts and efforts required beyond those currently underway. Detail integration plans if multiple projects are planned. Discuss relationsips with recently completed or onging ATD or A/JCTD efforts, if applicable.

3.3. **Key Measures of Transition Readiness**. Identify the key parameters or attributes that will be used as exit criteria to measure whether or not the T2BT effort is proceeding as scheduled. Include parameters to be tracked, current state, interim progress estimates and final objective. TRLs are a measure of technical maturity and can be used to assess readiness to transition. Provide dates when each higher TRL rating is expected to be achieved.

3.4. **Program Plan**. Show major activities/efforts of the T2BT technology development activity on a milestone schedule chart. Using Table 2 in Appendix A as a sample, show the relationship between these major milestones and the resources required to complete each task.

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1  DoD MRL Definitions v7 Oct 08  MRL Matrix Updated v7 Oct 08

3.4.1. **Financial Phasing Plan.** Show your cumulative obligations and disbursements (outlays) phasing by quarter for the two-year appropriation using the spreadsheet and instructions provided in Appendix B.

3.4.2. **RDT&E Budget Exhibit (R2a)**. Prepare a draft version of the R2a budget exhibit for your project using the template provided in Appendix C.

3.5. **Funding Adequacy**. State and agree that the combined sources of all funding are adequate to achieve the maturity and quantity of the T2BT required by the receiving PM in the timeframe(s) required by the PM and as specified in this document.

4. **Reporting Requirements**.

4.1. The Program Manager will provide a semi-annual technical status to the TTI Office no later than June 30 and December 31, a transition report to the TTI Office within 60 days of the transition event, and a final letter report to the TTI Office within 30 days of fielding the technology.

4.2. The Technology Manager will provide monthly funds execution status reports to the TTI Office NLT the 5th workday of each month. This report will also include the face page and accounting page(s) from all contract actions executed during the prior month.

4.3. The FY06 Appropriations Act included language that requires a quarterly report for the TTI Program. The Technology Manager will provide the necessary inputs for that report. The template (in the form of a sample) is at Appendix D.

4.4. To comply with requirements of the E-gov Act of 2002 (Public Law 107-347), detailed information on individual contract actions is required. This information is captured on the spreadsheet provided in Appendix E. Spreadsheet updates must be submitted when new contracts are awarded. *(Note: the file embedded in Appendix B should be used to submit both your phasing plan as well as this list of contracts.)* It is recommended you review your previous input for currency as you prepare your monthly funds execution update.

5. SIGNATURES.
(Document will be signed by cognizant S&T and Acquisition officials at O-6/GS-15 level along with OSD (Director, Office of Technology Transition))

			TTI Project Duration (4 years max)				Follow-on Procurement			Total
$M ($0.000)	PE	Appn*	FY11	FY12	FY13	FY14	FY?	FY?	FY?	Cost
Transition Funding										
OTT	0603826D8Z	RDTE-DW								**$0.000**
Source 2										**$0.000**
Total			**$0.000**	**$0.000**	**$0.000**	**$0.000**	**$0.000**	**$0.000**	**$0.000**	**$0.000**
Procurement Funding ($M) and Quantity to be Procured										
POR XXXX										**$0.000**
QTY:										**0**
Total Proc			**$0.000**	**$0.000**	**$0.000**	**$0.000**	**$0.000**	**$0.000**	**$0.000**	**$0.000**

Table 1: Funding Sources ($s in millions)

Organization	Milestone Task	FY11	FY12	FY13	FY14	FY15	FY16	FY17	Total
PMS-XXX	Contract Approval	$X.000							$0.000
NSWCCD	Development	$X.000							$0.000
NAVSEA O5X	Test & Evaluation		$Y.000						$0.000
NAVSEA O5X	Certification Award		$Y.000						$0.000
PMS-XXX	S T E		$Y.000						$0.000
PEO- X	1st Procurement	$Z.000	$Z.000	$Z.000	$Z.000			$Z.000	$0.000
PMS-XXX	1st Deployment		$Z.000						$0.000
	Total	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Table 2: Major Task Schedule and Funding ($s in millions)

Technology Transition Initiative - RDT&E,DW Financial Phasing Plan

Project Name: Enter TTI Project Name HERE in Cell D2

- Use Dollars in Thousands with NO Decimal Positions - Do Not Use Whole Numbers (ea $1,500,000 = $1500)
- RDT&E is a two-year appropriation, meaning the funds are available for obligation for two years. Disbursements should be approprimately 90% complete by the second year, and an expectation of almost 100% complete by the end of the third year.
- Submit a two year phasing plan with your TTA for the original fiscal year of funding, and each year on August 1 for any succeeding fiscal years of funding that may be provided. **Fill in all fields highlighted in green.**

***Obligations**: Amounts of orders placed, contracts awarded, services received, and similar transactions during an accounting period that will require payment during the same, or a future, period.

****Disbursements**: the amount of checks issued, outlays, invoices paid as recorded on official accounting reports. Base your estimates on expected timelines and amounts of contractors invoices submitted and paid, on in-house costs paid, etc. Do not base your estimates on work you believe the contractor has completed but has not invoiced.

- Monthly financial status reports require identification of monthly cumulative obligations and disbursements.
- Spreadsheet is not protected, but please do not change the format!

			First Year				Second Year				Third Year				
FY	Total Project Funding		QTR 1 Dec-10	QTR 2 Mar-11	QTR 3 Jun-11	QTR 4 Sep-11	QTR 5 Dec-11	QTR 6 Mar-12	QTR 7 Jun-12	QTR 8 Sep-12	QTR 9 Dec-12	QTR 10 Mar-13	QTR 11 Jun-13	QTR 12 Sep-13	
11	$0	Plan: Obligations* Cumulative													< Enter cumulative amounts,
11		Plan: Disbursements** Cumulative													not monthly change amounts.
11		Plan: Oblig % of Total													< If you get ### signs here, simply fill in
11		Plan: Disb % of Total													the Project Funding amount in column C
FY	Funding		QTR 1 Dec-11	QTR 2 Mar-12	QTR 3 Jun-12	QTR 4 Sep-12	QTR 5 Dec-12	QTR 6 Mar-13	QTR 7 Jun-13	QTR 8 Sep-13	QTR 9 Dec-13	QTR 10 Mar-14	QTR 11 Jun-14	QTR 12 Sep-14	
12	$0	Plan: Obligations* Cumulative													
12		Plan: Disbursements** Cumulative													
12		Plan: Oblig % of Total													
12		Plan: Disb % of Total													
FY	Funding		QTR 1 Dec-12	QTR 2 Mar-13	QTR 3 Jun-13	QTR 4 Sep-13	QTR 5 Dec-13	QTR 6 Mar-14	QTR 7 Jun-14	QTR 8 Sep-14	QTR 9 Dec-14	QTR 10 Mar-15	QTR 11 Jun-15	QTR 12 Sep-15	
13	$0	Plan: Obligations* Cumulative													
13		Plan: Disbursements** Cumulative													
13		Plan: Oblig % of Total													
13		Plan: Disb % of Total													
FY	Funding		QTR 1 Dec-13	QTR 2 Mar-14	QTR 3 Jun-14	QTR 4 Sep-14	QTR 5 Dec-14	QTR 6 Mar-15	QTR 7 Jun-15	QTR 8 Sep-15	QTR 9 Dec-15	QTR 10 Mar-16	QTR 11 Jun-16	QTR 12 Sep-16	
14	$0	Plan: Obligations* Cumulative													
14		Plan: Disbursements** Cumulative													
14		Plan: Oblig % of Total													
14		Plan: Disb % of Total													

DRAFT UNCLASSIFIED DRAFT

....OSD·RDT&E·PROJECT·JUSTIFICATION·(R2a·Exhibit)¶

APPROPRIATION/BUDGET ACTIVITY RDT&E/Defense-Wide/BA#3	PE NUMBER AND TITLE 0603826D8Z - Quick Reactions Special Projects - Technology Transition Initiative¶	Date:	PROJECT P829

Accomplishment/Planned Program Title	FY 2010	FY 2011	FY 2012	FY 2013
Project Short Title here	0.000	0.000	0.000	0.000

PREPARATION GUIDELINES¶

General guidelines: ¶

1) Dollars in millions¶

2) Spell out all acronyms once per page. (DoD Correspondence Manual and FMR).¶

3) Numbers 10 and less, spell out (DoD Correspondence Manual).¶

4) Use narrative paragraphs with full sentences, and avoid the use of bullet listings which add to the length of the document. Limiting all project information to one page is preferable.¶

5) Narrative in exhibits should be clear and concise. While using the technical language applicable to your project, it is still necessary to speak with enough sufficient clarity that OSD analysts and Congressional staffers can relate to the purpose and goals of your project.¶

¶

Required Entries:¶

1) Specific program name and a brief description. Include specific objectives, output or end-product, and or major technology effort.¶

¶

2) The primary outputs and efficiencies of this project are. Be specific, not generic, in this area. Identify metrics and/or improvements in metrics applicable to this project.¶

Accomplishments and Plans as shown below. For each year for which funding is budgeted, explain your initiative's accomplishments and/or planned outcome/objectives that will be funded with the resources provided for that year. ***Consider this a justification of the funding received for each year; not an identification of project workload phasing.*** To avoid the need for redrafting these budget exhibits too frequently over the life of the project, please try to *use present or past tense for* these Accomplishments and Plans narratives, avoiding future tense whenever possible. (i.e. "xxx *is scheduled for completion on* x-date" vice "xxx *will be completed* on x-date")¶

¶

3) FY 2010 Accomplishments: (Planned/Actual). This is a description of what you are spending or have spent your resources on. It is not limited to what is/was actually completed in your project phasing. Regardless of whether you awarded a contract that has two years to execute, explain what is being accomplished with the resources. What capability or value are we adding with the resources provided? Simply stating that you awarded a contract is not sufficient information. Instead, explain what is being delivered by the contract.¶

¶

4) FY 2011 Plan: What do you plan to do with the resources funded in this year? What capability or value are you adding?¶

5) FY 2012/2013 Plan: What do you plan to do with the resources funded in this year? What capability or value are you adding?¤

¶

DRAFT UNCLASSIFIED Exhibit R-2A Project Justification DRAFT

R2a Guidance

Appendix D

Quarterly Report Template

QUARTERLY CONGRESSIONAL REPORT
PE 0603826D8Z: Quick Reaction Special Projects
Project 829: Technology Transition Initiative (TTI)

Title: Command Post of the Future (CPoF) and Army Battle Command System (ABCS) Software Server Integration

Project Start Date: FY 2005

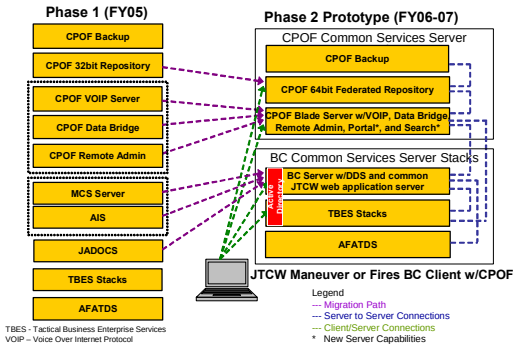
Combatant Command/User Sponsor: US Army

Lead Service/Agency: US Army

Project Description: Accelerate the merger and integration of Command Post of The Future (CPoF) and Army Battle Command System (ABCS) server software. Expedites the elimination of additional hardware in the field.

Current Problem: CPoF is a high priority DARPA-sponsored technology program that will provide a suite of collaboration tools used as an executive decision support system from Corps down through Battalion. The current CPoF system consists of both clients and servers. In the near/mid-term OIF rotations, CPoF hardware will be fielded side-by-side with Army Battle Command System (ABCS) hardware.

Project Solution: TTI Program funding will accelerate the merger and integration of CPoF server software and ABCS server software by at least one year, driving an initial battle command server consolidation focused-activity that will expedite the elimination of additional hardware in the field.



Project Period of Performance: April 15, 2005 –December 31, 2007

Deliverable(s):

- Documented comparative analysis of CPOF and ABCS server interfaces, configurations, and processing environments,
- Documented unified server target software and hardware environments, and

- CPOF-federated and battle command server software prototype builds in support of objective consolidated, integrated CPOF battle command capability.

Benefit to Warfighter: A common consolidated server infrastructure

Transition Plans: CPoF is transitioning to the Army; post-TTI effort procurement funding begins in FY 2008.

Lessons Learned From Completed Projects: N/A (project still ongoing)

Appendix E

TECHNOLOGY TRANSITION INITIATIVE - RDT&E,DW CONTRACT INFORMATION

Project Name: Enter TTI Project Name HERE in Cell D2

This data collection is to fulfill Director of Defense Research and Engineering (DDR&E) Research & Engineering Database requirements and the E-Gov Act of 2002 (Public Law 107-347)

Submit this spreadsheet with your TTA, and submit an updated spreadsheet whenever new contracts are awarded. **Report only TTI funding in column H.**
Note: for contracts in solicitation, enter "PENDING", but please do enter a projected award date and contract amount. Information updates will be periodically requested.

FY	Contractor Name	Contract Number	Mod Number	Award Date	Completion Date	TTI Contracted Amount ($ in thousands)	Dun & Bradstreet Data Universal Numbering System (DUNS)	Contractor POC	Street Address	City	State or Country	ZIP	Science and Research Area (see tab in this workbook)	Defense Technology Area (see tab in this workbook)	Defense Technology Area - Subarea (see tab in this workbook)

(Note: the file embedded in Appendix B should be used to submit both your phasing plan as well as this list of contracts.)